SPECIAL ISSUE

EDUCATIONAL METHOD

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NOVEMBER, 1939

INTELLIGENCE IN A CHANGING UNIVERSE

PAUL WITTY, *Special Editor*

Published by The Department of Supervisors and Directors of Instruction of the National Education Association of the United States

VOLUME XIX NUMBER 2

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EDUCATIONAL METHOD is published monthly from October through May, for the officers, directors and members of the Department of Supervisors and Directors of Instruction of the National Education Association. Executive office, 1201 Sixteenth Street, N. W., Washington, D. C. Managing Editor, Lou L. LaBrant, Ohio State University, Columbus, Ohio. Subscription price, $3.00 a year (Canada, $3.30, Foreign, $3.50). Single copies, 35 cents; special numbers, 50 cents. *All subscriptions should be sent to the Executive office, 1201 Sixteenth Street, N. W., Washington, D. C.*

Annual membership dues, for EDUCATIONAL METHOD AND YEARBOOK, $4.00 (Canada, $4.30, Foreign, $4.50). Entered as second class matter at the Post Office at Washington, D. C., and Columbus, Ohio, under the act of March 1, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized August 13, 1924.

EDUCATIONAL METHOD is a member of the Educational Press Association. Contents are listed in Education Index.

Photo by Roy Wenger and Hazel Gibbony

EDUCATIONAL METHOD

VOL. XIX CONTENTS FOR NOVEMBER, 1939 No. 2

FRONTISPIECE

TOWARD A RECONSTRUCTION OF THE CONCEPT OF INTELLIGENCE...*Paul Witty* 64

LOOK TO THE EVIDENCE! A CRITIQUE OF RECENT EXPERIMENTS ON RAISING THE I.Q.....*Florence L. Goodenough* 73

INTELLIGENCE TESTING: ITS BASIC ASSUMPTIONS AND UNANSWERED QUESTIONS.....*John T. Rockwell* 80

INTELLIGENCE AND DEMOCRATIC LIVING.....*John J. DeBoer* 93

SIGNIFICANCE OF THE INQUIRY INTO THE NATURE AND CONSTANCY OF THE I.Q.....*George E. Axtelle* 99

INTELLIGENCE OF NEGRO CHILDREN.....*Martin D. Jenkins* 106

SOME EDUCATIONAL IMPLICATIONS OF THE "CHANGING I.Q."..*Milton J. Cohler* 113

EDITORIAL COMMENT 118

TO THE MEMBERS 120

NEWS FROM THE FIELD 121

THE READER'S GUIDE 124

TOWARD A RECONSTRUCTION OF THE CONCEPT OF INTELLIGENCE

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Recent investigations upon the growth of intelligence necessitate a revised interpretation of the meaning and significance of intelligence testing. The concept that intelligence tests measure heritable and fixed potentialities for growth is being challenged. And the nemesis which is overtaking intelligence testers and demanding a change is a product of scientific study and careful investigation. For example, thorough laboratory investigations by Nancy Bailey and Harold Jones demonstrate that the I. Q's of individuals do not display the constancy previously attributed to them. Surely no thoughtful student can examine the growth curves presented by these investigators without becoming aware of the immense capacity for *modifiability* that characterizes the human being[1]. Moreover, one can scarcely fail to be impressed by the complexity of the problem of predicting mental development, since many factors (such as attitude, goal, and physical condition) seem to be important determiners of the nature and extent of change. In any event, it seems established that one may expect variations up and down the scale as the individual faces his problems and encounters experiences which alter vitally his values. To speak of the constancy of the I. Q. without concern for and description of many other items is apparently unjustifiable. But in the past this concern was conspicuously lacking in accounts of guidance, homogeneous grouping, sex or race differences in intelligence, and in fact, in most discussions of the I. Q. For the constancy of the I. Q. was accepted as a scientifically demonstrated fact, and administrators, supervisors, and teachers treated and guided individuals and groups accordingly.

That the ratings derived from intelligence tests vary widely in *individual* cases is not a new or startling disclosure, but the demonstration that large and lasting changes may occur in *groups* of children drawn from widely varied backgrounds necessitates modification in certain interpretations of the intelligence test. Moreover, the magnitude of the changes in the I. Q.'s of children commonly regarded as having fixed or restricted potentialities for development leads one to question sharply the doctrine of the inheritance of mental ability. Therefore, many school practices which are based upon an acceptance of an extreme hereditarian doctrine will require reconsideration and reorientation. This may necessitate basic changes that are far-reaching since there are relatively few schools in America that have not permitted their organization, instruction, and promotion practices to be influenced by the mental test movement.

[1]Cf. in this connection Nancy Bailey, "Mental and Educational Growth" in Chapter II of Witty, Skinner and Others, *Mental Hygiene in Modern Education*. Farrar, 1939. See also Witty, Paul A. "Intelligence Testing and Educational Practices," *Educational Trends*. July-August, 1939, pp. 25-32.

Socio-Economic Status and Intelligence

The scientific studies bearing on this topic have been summarized by Neff in the *Psychological Bulletin.*[2] The conclusion is drawn that the variations in the average I. Q. of children emerging from several social-economic groups may be accounted for entirely by differences in the opportunities offered by the disparate environments. Recourse to the doctrine of inheritance is unnecessary.[3]

Several approaches have disclosed various relationships of socio-economic level to intelligence. Coefficients of correlation between scores on scales of socio-economic status and from individual intelligence tests (Stanford-Binet) range roughly from +.2 to +.5. A similar range is found in the coefficient obtained from ratings on the Barr scale of occupations and individual intelligence tests. Neff reports an average of +.45 as a "safe estimate" for such correlations. The writer's studies yield +.48 as the average of three investigations in which ratings from the Barr scale were correlated with the Stanford-Binet test scores of children in the upper levels of the pre-school ages and in the elementary school.[4] The Sim's and other scales yielded coefficients of correlations with intelligence ratings of +.45. These results are roughly in accord with those given in the studies summarized by Neff. One should bear in mind that typically these coefficients have been obtained from studies of *children old enough to be in school.* In fact, until recently, very few investigations of this character included children younger than three years of age. Within the past few years, extensive data have been reported for infants and very young children.

Mental Growth of Foster Children

Several studies support data given by Marie Skodak in a recently published, very comprehensive study of the mental growth of foster children.[5] For 154 children placed in foster homes before they were six months of age, a negligible relationship appeared between estimates of the social-economic status of true parents and the intelligence ratings of their children during infancy and very early childhood. Certain similarities appeared, however, between the foster parents and children. The children whose foster parents were classified in the upper three occupational categories were above while those from the four lower categories were below the mean I. Q. of the total group. The appearance and development of these differences are described in the following quotation:

> During the first year the difference between the groups in the two types of homes is less than one point, corroborating studies which find no relationship between infant intelligence and family socio-economic status. By the second year a marked difference between the two groups exists which, though not statistically significant, initiates the trend evident throughout the age range covered.

[2]Neff, Walter S. "Socio-economic Status and Intelligence: A Critical Survey." *Psychological Bulletin,* Vol. 35, No. 10. December, 1938, pp. 727-757.

[3]This new evidence corroborates certain views expressed by the writer a decade ago. Cf. Witty, Paul A. and Lehman, H. C. "Dogma and Biology of Human Inheritance." *American Journal of Sociology,* Vol. 15, No. 4 (1930), pp. 548-564.

[4]Witty, Paul. "Some Results Secured in the Pre-School Clinic." *Ped. Sem. and J. Genetic Psychol.,* 1928, 35, 139-141.

[5]Skodak, Marie. *Children in Foster Homes.* Studies in Child Welfare, Vol. XVI, No. 1, January 1, 1939. University of Iowa Studies, Iowa City, Iowa.

> While both groups began at the same level and both lost in mean I. Q., the children in the relatively inferior homes, lost nearly three times as many points in mean I. Q. as did the children in the superior homes During the third, fourth, and fifth years, the differences continue to follow the same pattern. The children in the inferior homes continue to lose in relation to their initial status, reaching a mean of 104 during the fourth year and maintaining this during the subsequent two years. The children in the superior homes fluctuate between 118 and 114 I. Q., consistently remaining one classification above the children in the inferior homes. (pp. 60-63.)

It is important to observe that the growth curve for the children in the upper three occupational categories did not display the marked or consistent decline characteristic of the curve for children in the less successful groups. Thus it seems established that the character of the home exercises a large and potent influence on the I. Q. In fact, Skodak states that "the mental level of the true mothers showed less relationship to the mental level of the children than to the occupational classification of the foster homes in which the children were placed." And the "mental development of children whose fathers (true) came from the lowest occupational classification, that of unskilled laborers, was indistinguishable from the developmental pattern of the entire group of children. Those children placed in superior or in inferior foster homes have the same mean mental levels as all children placed in similar homes and examined at the same mean ages." (Item 14, p. 104.)

Sharp Contrast With Usual I. Q. Reports

These findings are strikingly opposed to frequently cited reports for *school* children which reveal a positive relationship between the social-economic status and I. Q. Illustrative of these studies is the writer's analysis of the average I. Q. of elementary school children whose parents follow various occupations. The average I. Q. of children from the homes of professional people is 116; from semi-skilled laborers, 105; and from day-laborers, 92. The differences between the average I. Q. of the children of day laborers and of professional people is 20-25 points. These results agree closely with data previously reported by L. M. Terman, L. S. Hollingsworth, and R. Pintner, as well as with those given by Terman and Merrill in a most comprehensive investigation.[6]

The existence of these differences will be conceded by investigators who will differ sharply in interpreting them. Burks[7] and Terman, representing the hereditarian position, would doubtless assert that by the side of inheritance all other factors of causation are "dwarfed in comparison," while others would insist that the environment opportunities of the more successful economic groups are rich in experiences that promote intellectual growth; and that these opportunities are more abundant at the early age when children's potentialities for improvement are greatest. The varied experiences of the more privileged groups foster growth while the impoverished opportunities of the less privileged

[6]Terman, L. M. and Merrill, M. A. *Measuring Intelligence.* Boston: Houghton-Mifflin, 1937.

[7]Burks, Barbara S., "A Summary of Literature on the determiners of the intelligence quotient and the educational quotient." In the Twenty-Seventh Yearbook of the National Society for the Study of Education. Nature and Nurture, Part I. Their Influence upon Intelligence. Bloomington, Illinois: Public School Publishing Company, 1928.

classes inhibit development and depress the I. Q. Support is given the latter position by Skodak's investigation which discloses no difference during infancy in the average I. Q.'s of children assembled according to parental occupation. Were heredity the significant agency in bringing about the differences in the I. Q.'s of children from various social-economic groups, its influence should be clearly discernible in infancy. Since its influence is not apparent at this time, the student can no longer point to heredity as *the* important factor in bringing about a positive relationship between the social-economic status of parents and children's test-intelligence. Instead, this relationship was found to transpire and develop with the operation of forces attending special opportunity and differentiated experience. Thus, the relationship appears to be largely a product of these opportunities and experiences. A considerable body of scientific evidence of another character adds support to the emphasis placed upon environment. Hugh Gordon,[8] for example, studied a group of canal boat children, who spent only four to five per cent of the time in school that typically is used by urban children of equivalent social class. The average I. Q. of the youngest children in the family (average age five years, ten months) was 90, while the average for the oldest children (average age eleven years, eleven months) was 60. Somewhat similar results have been reported by other investigators whose data suggest that group decreases in I. Q. may accrue in proportion to the degree of educational deprivation.

The exact effect upon I. Q. of improvement in areas of experience closely correlated with test-intelligence (i.e., reading) is unknown, for experiments yield conflicting results.[9] Several studies suggest that certain conditions which produce a marked gain in the reading ability of elementary school children have a noticeably beneficial effect on the I. Q.[9] It seems that intelligence tests reflect schooling to some degree and general cultural *milieu* to an even greater extent. Significant changes in the I. Q. do not ordinarily appear unless there is a pronounced and continuous alteration in the home or school environment. Alterations of large magnitude are infrequent in the *standard* environment of the home and still less frequent are far-reaching changes in the experiences of the typical school. Consequently, a relatively stable I. Q. is the rule among school children. However, when these changes do occur, I. Q.'s are altered.

At this point, it is relevant to point out that Wellman's studies suggest that when special educational opportunity is given pre-school children through the services of the nursery school, the I. Q. of groups of children is beneficially affected.[10] Such gains, moreover, are retained when fortunate educational opportunities are maintained; and they are vitiated when they are followed by severe educational deprivation.

It has been demonstrated that good homes exert their strongest influence

[8]Gordon, Hugh. Mental and Scholastic Tests Among Retarded Children. London: Board of Education, Educ. Pamphlets, No. 44, 1923.

[9]Witty, Paul, and Kopel, David. *Reading and the Educative Process.* Boston, Ginn and Company, 1939. Cf. also Scruggs, S. D., "Improving Reading Ability in Grades Five and Six by Extensive Reading": *Bulletin of Education,* Univ. of Kansas, April, 1931.

[10]Wellman, Beth L. "The effect of pre-school attendance upon the I.Q." *J. Exper. Educ.,* 1932-1933. I, 48-69. Wellman, Beth L. "Mental growth from pre-school to college." *J. Exper. Educ.,* 1937-1938, 6, 127-138.

when children are very young. Several investigations support this assertion.[11] Freeman, Holzinger, and Mitchell reported the gains in I. Q. for a large number of foster children. In one group, placed in foster homes at an average age of eight years, the mean gain after four years was 7.5 points. The greatest gains were made by the youngest children, with no child over 12 years of age displaying an increase in I. Q.

Decisive Increases Reported for Very Young Children

More decisive and significant increases have been reported for still younger children by Wellman,[12] and significant losses have been found by other investigators (Skodak, Skeels, and others) who have studied very young children in underprivileged homes. Moreover, these studies show that children who are adopted and placed in good foster homes make significantly larger gains than those placed in poor homes. Thus it seems that the character of the home and the nature of the child's pre-school experience influence and to some degree determine intelligence as measured by tests.

One surprising result of these studies of foster children is the unanimity with which high I. Q.'s have been obtained. Leahy, for example, gives data for a group of children of ages five to fourteen, all of whom were adopted before they were six months of age.[13] The mean I.Q. is 110.5 (S.D. = 12.5). Skeels cites an average I.Q. of 115.4 for 147 children adopted before they were six months of age.[14] Forty-one received I.Q.'s of 120 or above. Remarkable is the fact that in this study, the offspring of feebleminded and of *mentally borderline* mothers earned an average I.Q. above 110.

Skodak's analysis confirms these findings.[15] For 80 of the true mothers of certain foster children mental test results were available. The average I. Q. of this group was 87.7 (S. D.=15.8). The majority of the mothers fell "below average"; 53.8 per cent had I. Q.'s below 90, 16.3 per cent were borderline, and 13.8 were feebleminded. One may judge that the I. Q.'s of the fathers were comparable to the mothers' for the social status of the mothers and the fathers was similar; they tended to come from families in which dependency and social inadequacy were frequent. The mean occupational rating of the true fathers placed them between the slightly skilled and semi-skilled groups — about one occupational category below the mean for the entire country. The generally low social-economic status of this group was further suggested by the fact that 140 of the 154 children were known to be illegitimate.

The inescapable conclusion from Skodak's study seems to be that if heredity sets limits for mental development, these limits are broad indeed. For, within

[11]Described by Neff in *Psychological Bulletin*, December, 1938. Cf. also Freeman, F. N., Holzinger, K. J., and Mitchell, B. C. "The Influence of Environment on the Intelligence, School Achievement, and Conduct of Foster Children." Twenty-seventh Yearbook, Nat. Soc. Stud. Educ., 1928, I, 103-217.

[12]Wellman, Beth L. "The effect of pre-school attendance upon the I.Q." *J. Exper. Educ.*, 1932-1933, I, 48-69. Wellman, Beth L. "Mental growth from pre-school to college." *J. Exper. Educ.*, 1937-1938, 6, 127-138.

[13]Leahy, Alice M. "Nature-Nurture and Intelligence." *Genet. Psychol. Monog.*, 1935, 17, 236-308. Leahy, Alice M. "A study of certain selective factors influencing prediction of the mental status of adopted children." *Ped. Sem. and J. Genet. Psychol.*, 1932, 41, 294-329.

[14]Skeels, Harold M. "Mental Development of Children in Foster Homes." *J. Consulting Psychol.*, 1938, 2. No. 2, 33-43. Cf. *J. Genet. Psychol.*, 1936, 49, 91-106.

[15]Skodak, Marie. Op. cit.

these limits, "environment factors can operate to produce changes which for ordinary purposes may represent a shift from one extreme to another of the present distribution of intelligence among children." (p. 132). It was found that "the mental development of children of feebleminded mothers and the most inferior true family backgrounds is indistinguishable from that of children whose mothers are not feebleminded." Placed in superior homes, they followed the same general pattern of development as other children. Thus, it seems that "the mental level of the child is closely related to the type of home in which he grows up." An inferior home appears to depress the I. Q.; residence in a superior home in infancy (and even during the later pre-school years) results in a gain. It is abundantly clear that the very early years are attended by conditions which have an unusual impact in raising or lowering the I. Q. Those children "placed in very early infancy show mental development considerably higher than that of children placed during the pre-school ages."

Extent of Parent-Child Deviation

The extent of the deviation in the I. Q.'s of foster children and true parents is startling; it suggests the operation of a number of related forces under circumstances which may be profitably analyzed.[16] In attempting to account for these differences, one should recall that these children were adopted in infancy and that their early, most formative years were spent in an environment which foster parents may have been quite zealous to enrich and adapt to their children's special needs. Moreover, these parents may have been more zealous than the average parent to provide the optimum environment for the sturdy growth and development of the children whom they truly "wanted." It is certainly justifiable to assume that affection, love and concern, generously but judiciously bestowed on growing children, have very desirable effects upon wholesome nurture.[17]

Regardless of the factors which may ultimately be identified as the true *causes* of the high I. Q.'s of foster children, it does seem well-established that I. Q.'s are alterable to a degree previously unsuspected, and that rich and wholesome surroundings produce significantly large and seemingly lasting gains in I. Q. From these investigations, one might conclude that hereditary predisposition is not, in the case of intelligence, the limiting spectre it has so universally been assumed to be.

In accord with this conclusion, several other hereditarian doctrines should be re-examined. For example, Neff's analysis casts grave doubt upon the existence of *innate* differences in the intelligence of various social-economic groups. Differences are found in aver-

[16]There is little resemblance in the intelligence ratings of foster parents and children. The coefficient cited by Neff for children and foster parents is +.25 while that for true parents and children is higher, +.45. These facts have been disclosed in analyses of several studies. Burks, for example, reports data for over 200 foster children of ages 5 to 14, all of whom were adopted before they were 12 months of age. The intelligence test scores of this group correlated only +.25 with foster parents' ratings. The noticeable discrepancy in the coefficient for foster children and parents (+.25) when compared with that for parents and true children (+.45) invites speculation. Since the intelligence quotient is subject to changes when unusual conditions prevail, might it not be that the environment of the child in the foster home is *decidedly different* from that of the child in the typical home because of relatively greater anxiety and concern for the well-being of the adopted child? Hence, the coefficient of correlation might be somewhat lower for the ratings in the foster homes than that in the less variable standard or typical home.

[17]Skeel's studies give significant support to this thesis. A most significant concern of educators might be to provide and maintain "atmospheres" for growth.

age I. Q.'s but differences in environmental opportunities *alone* may be used to account for these disparities. One would be forced to conclude then that all doctrines of social distinction and class superiority which originate in mental tests are of questionable validity. The following sentences represent Neff's conclusions resulting from a critical analysis of the facts:

> All these points taken together lead to a conclusion which we feel is forced and inescapable. Just as Klineberg has shown that the standard intelligence tests are inadequate instruments for measuring the native ability of different races, *so do we find that these tests cannot be used for measuring the capacity of different social levels within our own society.* It should be emphasized that we are not raising here the question as to whether all of the abilities measured by the tests are determined exclusively by environment, although it should be clear from the studies analyzed above that environmental variables are very important. Rather, we are raising the question as to whether the generally obtained relationship between social status and intelligence test score requires any other explanation than an environmental one. We feel that there is strong, perhaps decisive, evidence for a negative answer. In other words, we have tried to show that although individuals at birth may differ in native endowment (a still incompletely settled question), it has definitely *not* been proved that social status of the parent has anything to do with the native endowment of the infant. That a positive relationship later in the life of the individual may develop is hardly denied. But all the summarized studies tend to show that low cultural environment tends to depress I.Q. approximately to the degree agreed to as characteristic of laborers' children, and that a high environment *raises* I.Q. correspondingly. All, then, of the twenty point mean difference in I.Q. found to exist between children of the lowest and highest status may be accounted for entirely in environmental terms. (Neff. pp. 754-755)

Change in Attitude Toward Intelligence Tests

Perhaps the most significant result of these various analyses of intelligence test scores is the shift of emphasis in the interpretation of the results of intelligence tests. For if one grants that alterations in intelligence are possible, it becomes imperative that an attempt be made to ascertain those situations and conditions which *promote* intellectual development. Attention thus is focused upon *improving* intelligence. In these analyses, one subtle factor, hitherto unmentioned or niggardly treated, appears to be of extreme worth. The concern of foster parents to provide an environment rich in opportunities for the development of a high order of intelligence and character seems to be an important factor in stimulating wholesome growth.

Foster children, because they are truly wanted, probably are accorded affectionate and sympathetic guidance which stimulates their optimum development. Desirable traits of character also appear to be nourished as interests and latent capacities find fulfillment; initiative and self-direction are undoubtedly fostered in such an atmosphere; and as creative abilities are expressed, gains in intelligence as a dynamic, exploratory ability doubtless accrue. Thus, the conditions for continuous sturdy growth are provided, with many desirable results, among them a noticeable gain in I.Q. These considerations lead to the conclusion that any treatment of the growth of intelligence is inadequate if it neglects the feelings, attitudes, and emotions of children and all persons

who are associated with them during their formative years.

The Role of Emotions in Intelligent Behavior

Psychologists and educators have been inclined to neglect these important determiners of behavior—the feeling and emotional factors in the life of the human organism. This condition is traceable no doubt to the fact that the dominant psychology of American experimental centers have been behavioristic or atomistic. It is abundantly clear that a psychology which is conceived in a mechanistic fashion (can we ever forget statements such as "man is a mechanism as much as is a locomotive; given the stimulus, we can predict the response with equal certainty") has provided little place for subtle, complex, and frequently unpredictable feelings and attitudes which play an important role in man's orientation and adjustment.

Formal education has depended upon habit formation as a central control measure, and accordingly has ingeniously supplied a surfeit of drill pads, work-books and other devices to accomplish its purposes. This fact and its results are emphasized in the following quotation from, *Emotion and the Educative Process:*

> We must contend that the more or less rigid daily routines of the school and the limited, formal assignments and discussions of curricular material interfere with normal motivation and break down interest and curiosity. Let any adult who has just completed the reading of an absorbing book imagine what it would have done to his interest to read it at the rate of five or ten pages a day over a period of one or two months, meantime making analyses of plot, language, structure, use of words, and the like. We do not contend that there is no place for this latter type of work, but there is certainly also a place for more spontaneous enjoyment of literature, music, art, and discussion. While this is not an original criticism, it is in need of reiteration as long as traditional practice dominates in so many of our schools. The trouble, of course, arises from the stress laid upon the intellectual aspects of school life to the exclusion or relative neglect of the emotional or affective side of experience.[18]

Analysts and hygienists, unlike most psychologists, have been concerned primarily with feelings and attitudes of the child or adult since their basic interest has centered in personality adjustment and orientation. But their influence upon American psychology and education has been until recently relatively unimportant. In an effort to preserve a system or school of thought, many psychologists resisted the frequently vague and often disturbing claims of the followers of Freud, Rank, Adler, Jung, and others whose work nevertheless has important implications for understanding and educating the child. Fortunately, we have witnessed a growing realization of the fact that man behaves as a *whole* organism whose complex drives to human action are rooted in many situations and conditions. With this realization has come the conviction that educators must be vitally concerned with children's feelings, with their interests, and with their attitudes. Prescott, in the volume cited above, emphasizes a major responsibility of teachers: "Is it more important that children develop adjusted integrated personalities or that they fulfill some other traditional academic objectives?" (p. 137).

[18]Prescott, Daniel (editor). *Emotion and the Educative Process.* American Council on Education, Washington, 1938.

If we are deeply interested in children's needs as they relate to personality orientation, we shall undertake to bring about basic changes in school practice. School administration and supervision will take on new meaning when schools are organized and administered in terms of children's needs at various levels of growth and development. Investigations cited in this paper suggest that intelligence can be altered appreciably during the pre-school period if the basic needs of children are satisfied in an atmosphere permeated by a sympathetic and affectionate concern for their growth. It seems that the school might do much to preserve these acquisitions and to insure their enhancement.[19] In so doing, many changes would be made and the typical teacher would of necessity develop new objectives and values. Primary interest would center in the child, his development and his growth. Consequently, his basic needs would become the determining factors in the selection and organization of school experiences. Teaching would involve responsibilities now infrequently assumed. Dominated by a vital interest in promoting maximum well-rounded growth in every child, the teacher would attempt to see that children's physical needs for food, sleep, rest, and expression are satisfied. Similar concern would be shown for other basic needs of the child which are blocked or threatened in many avenues of life today. Projects of many kinds would be so devised that every child would feel that he is a successful, contributing member of his group and thereby attain a "sense of worthy selfhood."

Under a school regime of the type described above, teacher-pupil relationships consequently will improve. No longer will we have the pedagogue on one side and his victim—the child—on the other. Sharing of purposes will result in the sharing of goals; the child's problems thus become the teacher's; and, with their resolution, gratifying satisfaction comes to both. No longer will the classroom be characterized by an atmosphere of discouragement and insecurity. Success in worthwhile endeavor will be anticipated; and tolerance, mutual concern, and cooperation will replace competitive, individual motives which rule the typical classroom.

We have had a lesson in children's capacity for growth in the unusual attainment of foster children and we have unique opportunity for testing the effect of a similarly sympathetic atmosphere upon the intelligence and character of children and young people in our schools. For our schools are at the present time free from the stultifying restrictions which in many countries would preclude such experimentation. It is conceivable that schools might become great laboratories in which courageous attempts would be made to engender, enhance, and preserve those attitudes and values which are esteemed most highly in a democracy. To achieve these ends, schools will have to give primary concern to the guidance of the emotional life, the attitudes and values of the developing child. This would seem to be a next step in education as well as a legitimate responsibility for schools established and maintained in the service of a democratic way of life.

[19]From these investigations, another responsibility of education. Pre-school centers and adult education programs are essential features of an educational process designed to engender and maintain sturdy growth. Every educational system, public or private, should extend its provisions to encompass these areas.

LOOK TO THE EVIDENCE!

A CRITIQUE OF RECENT EXPERIMENTS ON RAISING THE I.Q.

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Today as never before in history, the findings of the scientific laboratory play a vital part in our daily life. From the time of our morning orange juice with its carefully reckoned provision of vitamins and phosphorus to our nightly rest on some "scientifically tested" brand of mattress, the moments are few in which we are not being reminded, directly or indirectly, of the marvels of a scientific age. With the radio, the airplane, the automobile, television, and a thousand other constant evidences that the barriers of the impossible are steadily receding, it is hardly to be wondered at that when the lively imagination of Orson Welles conjured up the idea of a Martian invasion, his radio audience, whose minds had already been keyed to believe the unbelievable, found the hoax no more difficult to accept than other wonders of a miraculous age.

Not only in the field of mechanical invention but in the direct products of nature is science revolutionizing the world. The old saying about making two blades of grass grow where but one grew before has been more than realized. Not only have the two blades been grown but they have grown bigger and juicier. Thanks to scientific breeding and better care, the modern poultryman is able to average almost twice as many eggs per hen-day as his grandfather did; the dairyman has likewise increased the average yield of his cows, and the sheep-grower has improved the length and quality of wool.

In the realm of human behavior something has likewise been accomplished though here we have less reason to point with pride. Yet there is little doubt but that scientific study of the learning processes, of work and fatigue, of individual differences in ability, interests, achievement, and skills, as well as of many other similar topics has slowly but gradually enabled us to improve our educational methods and to take up some of the lag between social and industrial progress.

Whatever may be the question as to its value, it is certain that the volume of research that is being carried on in such fields as psychology, human biology, sociology, education, and other sciences that deal directly with the behavior of the human animal is so great as to tax the powers of even the most rapid and indefatigable reader who makes an honest effort to "keep up with the literature." The inevitable result is that most of us are likely to form the habit of turning with increasing frequency to such short-cuts as are provided by the various "digests," "abstracts", and the "summary and conclusions" that are to be found at the end of the greater number of the published accounts of research. Although for many of us this habit seems necessitated by the pressure of time, its hazards are obvious. The vagaries of human behavior are so many and so unexpected, and the difficulties of maintaining adequate scientific control of all variables that may play a part in

producing a given result are so great that even the careful investigator may easily fall into the error of overlooking crucial points that, if properly considered, might lead to conclusions very different from those set down at the end of his article. Particularly is this likely to be the case when the study in question has to do with some matter on which its author has already expressed himself in unequivocal terms. For no matter how scrupulous a scientist may be, he is still likely to find it more pleasant to maintain himself in the right than to admit himself to have been mistaken. When therefore, certain parts of his data seem to fall in line with his theory, there is inevitably a strong temptation to regard these as the really crucial facts and to accept them as valid without further question. At the same time he is likely to seek for such explanations or qualifications of any facts that seem contradictory as will either minimize their importance or change their significance. If he succeeds in demonstrating to his own satisfaction that the discrepancies in question are in truth of little consequence as far as the major purpose of the research is concerned, the chances are that in summarizing his findings for the busy reader he may omit all mention of them, or at most pass them by with a brief mention.

The many and unexpected facts that have turned up in recent and well-controlled experiments in human behavior have rendered many unsophisticated readers well-nigh as credulous as were those who fled from Orson Welles' Martians, and even the best-informed may easily be misled when a scientist of recognized standing "summarizes" only the positive findings of a piece of research and "concludes" from this incomplete presentation of the facts that certain principles are true. An outstanding example of this is to be seen in the widespread popular acclaim that has been given to certain studies that have recently emanated from the laboratory of the Child Welfare Research Station at the University of Iowa. In these reports, the claim is put forth that by proper training, especially such as is provided in the modern nursery-school, the (true) intelligence of children can be raised to an astounding degree. Feeble-minded children, it is said, can be made normal and in proof thereof they cite an experiment in which every member of a group of thirteen "feeble-minded" infants was brought within the range of normal mentality through training by moron nursemaids in an institution for the feeble-minded! The children of feeble-minded women, if reared in superior homes, will, we are told, be indistinguishable in mentality from those of college professors. On the other hand we are warned that in a non-stimulating environment, children originally normal are likely to become truly feebleminded.

In spite of my high personal regard for the Iowa investigators, I believe that their data have been grossly misinterpreted, particularly in the popular accounts intended for the untrained reader. The discrepancies between data and conclusions are in many instances marked. In other instances, essential features of experimental technique were so poorly controlled that no real conclusions seem justified. Nevertheless, the trustful reader who does not take time to examine the original reports with much care is almost certain to feel that

the authors' claims have been amply substantiated. Particularly is this likely to be true of those who do not have immediate access to the main publications and who therefore rely upon the rather sensational articles that have been flooding the Sunday supplements and the popular magazines, or upon the abbreviated accounts of findings that have appeared in many of the educational journals and similar publications.

Were it not for these vigorous and continued efforts on the part of the Iowa group to spread the new theory among the general public and among teachers, social workers, and others who, because of their limited technical training, are less well qualified to judge the caliber of the evidence upon which it is based, there would be little need for those of us who have examined the data and found it wanting to do more than wait quietly until the absence of confirmation from other sources should point the need for the Iowa group to do one of two things: either to describe the methods by which these surprising results have been obtained so clearly that others would be able to reproduce them or to admit themselves to have been mistaken. But the extent to which the theory has been publicized among those who are actively concerned with matters of such immediate and practical import as the placing of children for adoption or the planning of nursery school curriculums demands that the facts be made clear.

A large share of the Iowa results can be traced directly to two basic hypotheses, neither of which is accepted by most reputable scientists of the present day. The first hypothesis is that intelligence tests given to infants and to children of two or three years of age have essentially the same predictive value for later mental development as those given after school age. The second is that the reliability of such tests for the measurement of mental status at the time they are taken is so nearly perfect that the effect of statistical regression due to errors of measurement may be safely ignored. It is true that neither of these hypotheses has been formally stated as such in any of the Iowa publications. Nevertheless, both are implicit in their methods of handling the data and in the conclusions drawn therefrom, since if the hypotheses are untenable, the former become unsound and the latter unwarranted.

That intelligence tests given to infants provide no inkling as to their future mental status has been shown by Furfey and Muhlenbein,[1] Bayley,[2] and a number of others. Since these studies are based upon children reared in their own homes, it is impossible to impute the absence of relationship between earlier and later status to a major change in environmental stimulation. Honzig[3] carried the study of the mental development of the children in Bayley's group into the later ages of childhood and showed that while tests given after the age of about eighteen months provide some indication as to what the later course of development is likely to be, the error of estimate is still so large that a judgment

[1]P. H. Furfey and Josephine Muhlenbein. "The Validity of Infant Intelligence Tests." *J. Genet. Psychol.*, 1932, 40, 219-221.

[2]Nancy Bayley. "Mental Growth During the First Three Years: A Developmental Study of Sixty-one Children by Repeated Tests." *Genet. Psychol. Monog.*, 1932, 14, No. 1, 1-92.

[3]Marjorie P. Honzig. "The Constancy of Mental Test Performance During the Preschool Periods." *J. Genet. Psychol.*, 1938, 52, 285-302.

of the future potentialities of an individual child on the basis of tests made before the age of six or seven years would frequently lead to gross error. Anderson[4] has made a very complete survey of the correlations between tests given at early and later ages from which he has drawn certain theoretical conclusions that are of major significance for all students of the principles of mental growth.

Not only do tests given early in life have little value for prognosis, but even when the results are looked upon as measures of present status only, inaccuracies are frequent. This is particularly true of the first measurement taken, when the situation, and often the examiner as well, may be unfamiliar to the child. Such factors as shyness, negativism, and the like that interfere with his making as good a showing as he should are likely to be at a premium at the time of his first visit to the laboratory. On later testings, better cooperation is usually secured, and his I.Q. will show a corresponding increase. Usually, however, this gain will not occur in all the cases of a given group. As a result of lucky guesses on marginal items, more lenient scoring on the part of a particular examiner, and so on, the initial scores of some children may actually exceed those earned on a later occasion.

We may say, then, that a child's test score on any single occasion may be represented by the following formula:

$$S_{obt} = S_t \pm E_1$$

where S_{obt} = the score obtained
S_t = the score corresponding to his true ability at the time of measurement
and E_1 = the error of measurement which may, of course, be either negative or positive in sign.

If, then, a group of children of varying initial I.Q. is separated into smaller groups, putting those with the highest initial scores in one classification, those who stood next highest in another, and so on down to the lowest, it follows as a mathematical necessity that not only that portion of the score which is due to the child's true level of ability but also that due to chance will play a part in determining the grouping, and since errors of measurement are uncorrelated with each other, it will also follow that when these children are retested, be it on the following day or after an interval of years, those originally testing highest will appear to lose[5] while those originally

[4]John E. Anderson. "The Limitations of Infant and Preschool Tests in the Measurement of Intelligence." *J. of Psychol.*, 1939, 8, 351-379.

[5]Although this regressive shift will, it is true, be shown on any subsequent test whatever the interval, it will be greater for long than for short intervals since the magnitude of the correlation between tests decreases with the length of time intervening between them. For a similar reason it will be greater at the early ages than at the later ages.

It may also happen that factors other than regression may operate in such a manner as to cover up the regressive shift; if, for example, cooperation on the first occasion is very poor for practically all of the cases, while, as a result of better acquaintance with the examiners or other factors that are not unlikely to occur, particularly when tests are given by nursery school teachers, even the group originally testing highest may show some apparent gain on a second test, if the effect of non-cooperation has been sufficiently great to outweigh any spurious advantage due to lucky chance. This does not mean that the effect of regression has been removed but only that its pattern has been modified as a result of the large increase in the general mean. That regression is still operative will be apparent from the fact that although those originally testing high may show a small further gain upon retest, those originally testing low will gain by a much greater amount.

There is some evidence, also, that children who are truly bright or truly backward may on the average depart further and further from the general mean with advancing age. This theory, which is popularly expressed by saying that high I.Q.'s tend to increase, low ones to decrease, has never been completely demonstrated. Since the tendency seems to vary with the test used, it may be nothing more than an artifact of standardization. However the fact that such a tendency has appeared in a few careful studies has sometimes been cited as evidence that regression cannot account for the results obtained in the Iowa studies, since in other instances the shift in standing has been found to take the opposite direction. This argument, however, does not hold. Factors influencing test scores are not mutually exclusive but several may be operative at one

testing low will appear to gain. This tendency is known as the "regressive shift."

In practically all the studies from the Iowa laboratory, the practice just described has been followed. In no case has statistical allowance for the factor of regression been made, nor has the principle, which is well known to all competent statisticians, been taken into account in their interpretation of results. Rather they have chosen to pin their faith to a theory of their own which is, briefly, that any environment has a certain determinate degree of stimulative-value to the level of which all children who are subjected to it tend to gravitate. Children originally below that level will improve their standing, those above it will lose.

Although this theory has a certain amount of surface plausibility, it should be obvious that before accepting it as valid, the amount of such change that can be charged up directly to the law of regression should first be determined. The statistical procedure by which such calculations can be made is well known; it is surprising that thus far no one at Iowa has seen fit to apply it. If this were done and it were found that the observed amount of change exceeded that to be expected from regression alone, then, and only then would further explanation be called for.

Even without such calculations, however, certain points remain to be explained. If the differential gains and losses are due to the leveling effect of the environment, that is, to the tendency of all children to move toward a common level, individual differences within the group as a whole should assuredly be decreased. If, on the other hand, the only thing that is happening is a shifting about of those portions of the individual scores that are due to errors of measurement, the group variability would not be materially changed. Examination of the numerical findings in the Iowa studies shows that in none of the instances in which this "leveling" effect is stressed have the standard deviations of the distributions materially changed with the passage of time. For example, page 45 of the monograph describing the deleterious effect upon child intelligence of continued residence in an orphanage judged to be very "non-stimulating" in its effects[6], the statement is made, "The trend for the control group is very clear. Regardless of the original classification, all groups headed for a final classification between 70 and 79 I.Q. The effect of long residence for the control children was thus a leveling one, tending to bring all children to high grade feeblemindedness or borderline classification." But Table 2 of the monograph shows

and the same time. If it so happens that some of these are factors that tend to increase the test score while others tend to lower it, one side may outweigh the other and the scores as obtained will then show a constant bias on the side of the factor that has the heavier weighting. But the smaller factor has still played its part in determining the result even though that effect may not be immediately apparent.

Regression due to errors of measurement will always and of necessity occur whenever the measuring instrument is fallible,—a condition that exists with every mental test thus far standardized. If the effect fails to appear in any particular instance, that can only mean that some other factor has been operating in the opposite direction so strongly as to mask the regressive trend. Such masking is, of course, more readily brought about when the errors of measurement are small, and it is interesting to note that all the studies thus far reported in which the tendency for children whose initial I.Q.'s were high to gain upon retest and those with low initial standing to lose have been made upon children of school age. Changes of this kind might be due to any of the following factors: to an artifact in the standardization of some particular test, to a greater tendency on the part of bright children to seek out the answers to remembered test-items on which they knew they had done badly,—a thing that is known to have occurred in some schools in which a good deal of testing is regularly done—or to a genuine rule of mental growth. But the possible existence of supplementary factors does not affect the general principle.

[6]Harold M. Skeels, Ruth Updegraff, Beth L. Wellman and Harold M. Williams. "A Study of Environmental Stimulation; An Orphanage Preschool Project." *University of Iowa Studies in Child Welfare*, 1938, XV, pp. 191.

that at none of the three residence periods considered, is there a significant change in the standard deviations between initial test and retest, either for the group that was given preschool training or for the control group.

The claims as to the advantages of nursery school training may be checked from another angle. Are these results limited to the Iowa nursery schools or do others secure similar results? In the 1940 Yearbook of the National Society for the Study of Education, reports from nine well-known child development centers will deal with this topic. Eight of the nine show no effect whatever upon child intelligence as a result of nursery school experience[7] though they do illustrate a number of ways in which a spurious appearance of such results might arise from lack of the essential scientific controls, such, for example, as the use of control groups not attending nursery school but of similar home background and tested at corresponding ages and intervals of time. The one study that purports to show such an effect (from the Merrill-Palmer School) may be questioned, since the manner of handling the data was taken over directly from that used at Iowa, and is subject to the same criticisms. Incidentally it may be noted that the mean gain of the Merrill-Palmer nursery school children is no greater — the actual figure is slightly lower — than that found for children not in nursery school who were used as controls in other studies previously mentioned. No control group was used in the Merrill-Palmer study. One might also raise a question as to the social value of improving the mental level of the more backward members of the community if this can only be accomplished at the cost of lowering the mentality of the highly gifted! In the Merrill-Palmer study, the mean "loss" in Stanford-Binet I.Q. for children first testing above 140 was 10.3 points; the mean "gain" for those first testing below 90 was 18.8 points and for the entire group the gain was 4.1 points. If we impute the "gains" of the group with low initial standing to the effect of the nursery-school training, logic demands that we ascribe the "losses" of the exceptionally bright children to the same cause. The practical conclusion would then be that bright children should under no circumstances be sent to nursery school for fear of lasting damage to their mentality!

One more point may be raised that, like the two previously mentioned, applies to all the studies from the Iowa laboratory. This is the possibility of systematic error in testing as a result of the examiners' knowledge of previous test results for individual children and of the group (experimental or control) to which the various children belonged. Since in none of the reported studies is any mention of control of this highly important factor made, it is pertinent to raise the question as to whether any special precautions were taken to guard against errors arising from this source. Anyone familiar with the many special devices employed in all modern psychological laboratories to insure that the results of experiments shall be free from the influence of secondary cues arising either from pre-judgment of the stimulus or suggestions as to the expected re-

[7]The seven centers referred to are: the Institute of Child Welfare of the University of California, the Winnetka Public School System, the Utah State Agricultural College, the University of Cincinnati, the Rhode Island College of Education, the University of Michigan, Western Reserve University, and the Institute of Child Welfare of the University of Minnesota.

sponse, should appreciate the need for utilizing every possible means to make sure that slight variations in testing procedure resulting from unconscious bias on the part of the examiners is ruled out. No one acquainted with the personal integrity of the authors can seriously raise the question of *conscious* intent in the possible modification of results through variation in testing procedure; for my own part, I am confident that no such intent existed. But the administration of an individual test to a small child is not, and cannot be, the formalized kind of procedure that is used with older children, for to make it such would defeat its own object. The testing of young children is an art in which there are many essential variations. In each test given, the aim is to secure from the child the best response to the standardized task that he is capable of giving. In order to allow for differences in child personality, many important details of procedure are wisely left to the judgment of the examiner. For example, the length of time allowed for a given response is usually left unspecified, since too long a delay may be undesirable in the case of a child who is restless and distractible just as too short a time-allowance may be upsetting to the one who is slow or timid. The precise amount and character of praise for a child's performance are also left to the judgment of the examiner, for an amount of commendation that is barely enough to keep up the morale of a very shy child or one who is lacking in self-confidence may lead to cock-sure carelessness in the case of another. Many other details of test-administration are likewise intentionally left flexible enough to provide leeway in which the skilled examiner may adjust his methods to the personality of the individual child. This flexibility of procedure is one of the great advantages of the individual test as compared to the group test. But it also opens the way for many small but systematic variations of which the examiner may be wholly unconscious but that may readily skew experimental results in one direction or another to a degree that only those who have had considerable first-hand experience in the testing of little children and in the training of students in testing can fully appreciate. Obviously, no one can know to what extent this factor has actually affected the Iowa results, but certainly the fact that it seems to have has been left uncontrolled makes the question of its possible contribution a very pertinent one.

Space does not permit me to make a point-by-point comparison of the evidence and the conclusions that have been drawn from it nor is it necessary that I should do so. This important task has already been performed by McNemar, an account of whose findings will be published in an early number of the *Psychological Bulletin*. The purpose of this brief comment is merely to urge the need for caution on the part of those who might otherwise be inclined to accept the Iowa conclusions at their face value and to suggest that before arousing vain hopes in the minds of parents whose children seem less brilliant than their expectations, or attempting to modify legislative precautions in regard to the placement of children for adoption, the facts as well as the theories be given critical consideration.

INTELLIGENCE TESTING: ITS BASIC ASSUMPTIONS AND UNANSWERED QUESTIONS

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One day, some years ago, I was sitting in my office when a student entered. She was a stranger, registered in another department. She seated herself, looked at me in a rather casual way, and then remarked that she was a *genius*.

I had known, ever since I had read the Stanford studies on genius, that a considerable flock of them were at large. I fear I had assumed — or rather, hoped — that most of them were within the confines of California; yet here, by her own admission, was one in Minnesota. I had then, and still have, a very high respect for a high I. Q. But I also had then, and I still have, a profound contempt for the witlessness of an individual who confuses a good performance on a test with the achievement that we ordinarily associate with genius.

This individual knew enough about mental tests and their meanings to be able to force-feed her egotism. Very obviously, though, she knew very little of the complexities of theory and practice associated with test construction, application, and interpretation. The amazing complexity of the human organism, with its nice potentialities for adjustment and variation, was to her an unknown territory. Mental capacity was an obviously measurable and definite trait. She was convinced that she was superior because she knew what her score was. The meaning and limitations associated with that score were not to her, at that time, a consuming object of search. Her achievement in academic work, as I found out later, was good. Her personality was not unpleasant; her drive was excellent.

Later, I had occasion to observe at very close range another student who possessed a very high I. Q. She was my assistant for a while. Her record had been one of amazing industry, good sense, and hardship. I knew her for a considerable period of time before she told me that she was one of the gifted group studied by Terman. In the time that I knew her, I came to realize what magnificant intellectual powers she possessed. Her poise, her capacity for sustained effort, her unqualified interest and independence in her research set her apart as a very unusual person.

What struck me then so forcibly was the tremendous difference between these two people. I still am unable to answer the question whether these differences are not more meaningful and significant, even to an understanding of the genesis and character of genius, than were the similarities which they displayed. In a sense, neither of these two people has fulfilled the promise of the diagnosis in the manner in which the layman thinks of genius. One, the latter, has been dead for several years. The former has not, so far as I know, attained a position of great distinction in any one direction.

I hope that she is a wiser person now than she was then, and capable of probing into the intricacies of the data bearing upon the question of behavior. If she has done this, she will now know that

we do not test intelligence directly. Instead, we measure it through the testing of short samples of learned behavior. She may even suspect that no technique of measuring learning has ever proved to be entirely adequate, and that any defect in the measurement of learning can be extended with equal force to the measurement of intelligence. In that case, she may have given up the idea that she is so phenomenal.

I hope that she has learned something of biology, and that she now realizes what a tremendously complex and amazing thing the living organism is. To be able to see the living organism respond under the compulsion of specific stimuli — such, for instance as deviation in blood calcium — can hardly do else than to raise the question of the meaning and extent of these complex inter-relationships.

If she has invaded these, and similar territories, she may by now question the nature of reliability employed in test procedure and the measures of validity resorted to. Her faith in tests, as useful instruments, will not be shaken; she will accept them for what they are — extremely useful instruments. But her faith in the interpretations of test results, particularly as they have been extended into the fields of heredity and the prognosis of genius, may be considerably disturbed.

I hope that she still believes in measurement, even if measurement is done rather badly. For that would mean that she cannot accept too readily a position based on faith and having little dependability other than a will to believe.

I hope that she still possesses her youthful positiveness and self-assurance, but that it is now the expression of a faith in herself derived from the consciousness of power over a wide scope of knowledge instead of a self-assurance arrived at through comparing her performance with that of others on short samples of learned behavior.

And finally, I hope that she recognizes the great social obligation that rests upon a person of ability; that she sees clearly what the leaders of the world, many of whom fall within her own mental ability class, have managed to do with, and against, other human beings. Ability which is self-centered may be spectacular and even extremely valuable in its social expression, yet the great contributions of art, science, and statesmanship seem to have emerged from people who wanted to do something, and that something seems nearly always to have some relationship to human needs and interests. Is it not possible that a too obvious awareness of one's own great superiority to other people might be the very factor which would defeat one in establishing rapport with people in the matter of their interests? This could hardly do other than to impede the artist and the statesman. And many a great scientist has derived his drive from an earnest desire to improve the status of human beings and their control over the elements of a hostile universe.

If she has progressed in some of the foregoing directions, then I would be inclined to believe that the characterization of genius might have been justified, or near-justified. For, instead of being what it then was, merely a high-ranking position on a set of performances, it would have represented a performance that had predictive value of future

growth and accomplishment, not too distantly removed from the layman's concept of genius.

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When Alfred Binet evolved the first mental test, thereby setting the whole mental test pattern as we now know it, it is doubtful that he conceived the immense potentialities which his instrument possessed. Had he been able to foresee the extended use, and perhaps misuse, to which this testing instrument would be put, he would in all likelihood have issued a warning to his unwary and overzealous followers against the misapplication of his procedure. That he was capable of this is clearly indicated in his writings and in the procedures which he employed. Binet never used the Intelligence Quotient. Rather, he adhered to the use of the Mental Age. I like to believe that this was with intention, that he saw that reduction to precise quantitative terms could lead to little good, and perhaps to much harm.

Recognizing that no dependable medical diagnostic means were available upon which to accomplish segregation of retarded children, Binet made a frontal attack through the avenue of learning. The utter realism employed deserves great admiration. No activity shows greater importance in the adjustment of the organism than learning; even reflexes, as demonstrated by Pavlov, are influenced by learning. Binet, apparently, recognized the great importance of learning in human behavior. Whether he conceived of learning potential as being the expression of a definitely unmodifiable neural mechanism is open to question. Possibly he did so conceive it.

Neurology at that time was bound rather tightly in the throes of an atomistic theory. Different parts of the neural system were supposed to be highly differentiated for specific functions. What is more, the whole realm of physiological chemistry had hardly been opened up. Since then, there has emerged a mass of data bearing upon the question of function. Much of these data, such for instance as the material in the field of internal secretions, bears specifically upon neural operation. Such data, when put side by side with modern research on brain localization, certain studies in the field of embryology, as well as many studies within the strictly psychological territory of learning, tend to raise a large question mark after any theory which posits a strict atomism.

Intelligence testing, positing as it does a relatively fixed and constant I. Q., might properly be regarded as an expression of atomism not unlike that current in faculty psychology of a hundred years ago. It is this type of atomism in biological theory that must be examined before we will be able to determine whether the apparent unmodifiability of the I. Q. is authentic or merely an artifact resulting from procedure employed in test construction.

Variation, as a great principle of biological design seems to be ever-present. Other organs and tissues manifest this through clearly observable changed behavior. Such changes in behavior would hardly be possible if the organism were so constructed that tissues had entirely discrete and independent functions. Neither is it conceivable that the nice coordination which the living organism displays could be accomplished through mechanisms confined to a low range of potential performance. The very in-

flexibility of the I. Q. is in itself a great exception. In other biological functions, observers find not constancy, but variation. In mental testing, just the reverse holds. What, then, of this mechanism which controls intelligence? Are limits more positive in its case or are those limits produced through the way we measure it?

Learning

I have sometimes said to my students that if a kind fate were to give me the privilege of knowing the one fact in psychology that I would like most to understand, I would choose to know the physiological basis of memory. If one understood thoroughly the physical basis of memory — the chemistry underlying it — much that is now vague, even disorderly, in psychology would then be clear.

Memory is intimately associated with, and perhaps dominant over, most of the other mental processes. Perception, association, imagination, and even intelligence, are all governed by it. Upon the base of memory rests all that we prize in our culture. For without memory learning would be meaningless — or even nonexistent. This vast and complex social heritage of ours has been made possible through the fact that neural tissue can register impressions and retain them. What is even more strange is that these same impressions can emerge in new forms and new settings when the organism has to adjust to critical and unusual demands.

The mechanism of memory becomes all the more baffling and mystifying when one attempts to compare the attributes of *learning-in-process* and *learning-accomplished*. The learning process, in action, is highly variable — as a matter of fact, learning as we think of it, could not take place were it not variable. Each trial must deviate from each preceding trial or gain in achievement is not accomplished. In the process of learning it is this everpresent variability that is its outstanding attribute. Repetition of an act incorrectly or inefficiently never accomplishes learning. Repetition of the elements of an old act plus new and better variations constitutes growth or learning.

Learning-accomplished is quite different. Instead of manifesting the labile, changeable character of learning-in-process, learning-accomplished shows the most stable kind of characteristics. Habit implies stability. An habituated act does not change until some problem confronts the individual. When the old habit is no longer adequate to take care of the situation, a new incentive appears. Variations in the act take place. A new phase of learning is initiated and will continue until the new pattern satisfies the demands of the situation, when it again enters its stable, lethargic stage.

It may be said at this point that I am positing an entirely improper distinction by reason of the fact that learning is a process, while memory represents something substantial, perhaps a chemical change or reorganization within the brain cells. The point is well taken. Everything known about memory testifies to its substantiality, while the performance of a person in the process of learning is highly variable and changing trial by trial. But measurement in the field of learning furnishes considerable evidence for the distinction which has just been made. Subjects display great consistency trial by trial in an act that

has once been thoroughly learned. The same subjects may show great fluctuations in performance on the very same function when it is in process of being learned. There is considerable evidence to indicate that these variations may be due to a multitude of factors, emotional state, fatigue, ill health, et cetera. The fact of the variability of the subject on the same function at different stages in the learning act is, in itself, of sufficient importance to warrant careful scrutiny.

When we measure learning-in-process, we accept this variable quality. No criterion yet employed reveals stability. Time, errors, trials, the traditional criteria, all show change from trial to trial, indicating that the subject is not the same today as he was yesterday. Pavlov, who has invented and employed probably the most sensitive of all learning criteria, namely, salivary secretion, reports tremendous variability in his subjects. The slightest change in the testing situation, such as a change in the time sequence of the stimulus, produces a great change in the response of the subject, as measured in the flow of saliva.

More will be said about this question of variability under the section dealing with reliability. Enough has been said here to indicate that learning-in-process is one of the most dynamic and variable responses which the organism displays in any of its activities. It is dynamic, even creative, by reason of the fact that the subject is changing trial by trial, and with reference to some end or goal. Were this not true, learning could never be accomplished. On the other hand, learning-accomplished is stable and nonvariable as long as the environmental demands are uniform and stable. When they change, the old habit-pattern is useless. When this happens, a new response must be devised, and this means a new act of learning.

As suggested earlier, we do not measure intelligence directly. Instead we measure it through testing the individual on short samples of learned behavior. Not only must they be learned, but they must be thoroughly learned by a considerable portion of the age level in question. The method employed in test standardization demands that. In standardizing tests we discard all tests that do not show age discrimination and that cannot be passed by at least fifty per cent of the children of the age level in question. Might not this elimination of all content except that which is familiar to at least fifty per cent of the children result in an emphasis on overlearned responses?

At this point, several questions in regard to the theory and nature of intelligence testing emerge.

1. Is it possible that one reason intelligence tests show high reliability is the use of very stable overlearned material? If we are employing overlearned material, then the fact that the I.Q. remains relatively constant should cause no surprise. In fact, it would be surprising to find it deviating much, except in those physical states representing a real deterioration in memory. It is interesting to note that the mental testers have never adequately explored either of these possibilities. Their faith in their instrument has been so profound that they have not attempted to study stability of performance in relation to this factor of overlearning. Neither have they studied it fully in relation to deteriorating mental conditions associated with

physical pathology which reflects itself in a deteriorating memory.

2. Are the attributes of accomplished learning more significant for diagnostic purpose than learning-in-process would be, if we were able to measure both equally well? This question raises another question: Do we measure learning-accomplished more accurately than learning-in-process? The answer is emphatically "No!" Learning, with the mental testers is measured by a "pass-fail" criterion. Above a certain level the performance is "passed," below "failed." Such a criterion cannot possibly reflect fine gradations of performance. As a consequence, variability, even if it were present, would be difficult to detect.

3. Employing the simple "pass-fail" technique that intelligence tests usually employ, is it possible that the nature of the criterion itself is so crude that it does not show fine gradations in deviations of the subject?

Variation: Its Primary Conflict with Current Theories on Reliability and Validity of Tests

Teachers are inclined to say, "That child is very reliable"; a wife sometimes says, "My husband is reliable"; and testers refer to their tests as having a "high degree of reliability." Essentially they all mean the same thing. The teacher means that there is a consistency of performance in the child that can be depended upon in predicting his future responses. The wife is probably whistling in the dark. But if she believes what she says, she thinks that she has observed her husband in enough different kinds of situations that she can be relatively sure that he won't do what he shouldn't do, and that he will do whatever she would like to have him do. The tester thinks that his test measures a consistency of performance, assuming a constancy of test situation. This means that the items of the test must be the same in test-retest administered under identical conditions. If, then, individuals occupy relatively the same rank positions, the tester assumes that this is evidence of consistency within the subject. The combined consistency of the group constitutes the measure of reliability of the test.

Reliability, as ordinarily conceived, rests upon the satisfaction of two major conditions. First, and most important, it is a measure of consistency within the subject. Were the subjects who compose the group tested found to deviate widely in the retest as compared with the initial test, then no high index of reliability could be obtained and most testers would regard the test as an independable one. Here the significant factor lies within the individual and the group — and is directly related to something that remains nonchangeable or nonvariable within the subjects.

The other factor that influences the degree of reliability depends upon how the group tested has been made up. If the group sample is not typical of the total population, then the test could have little value when applied to other groups. This second condition is important in determining whether a test has a respectable reliability. It is, however, subsidiary to the first, because the assumption is clearly present that there are consistent and stable performances in the behavior of individuals. This being the case, it is necessary to control the test situation through securing an adequate sample of the population.

The use of analogy — always dangerous — in defense of the point is interest-

ing. It is argued that if one measures the scales of fishes, the heights of men, the length of feet, etc., there occur throughout the natural world deviations, and these deviations distribute themselves upon the basis of a normal distribution. Assuming the same to be true in the mental realm, performance upon any mental trait will show a similar distribution. There is thus implied a static, stable quality to the trait.

Since tests, as constructed, do show a high index of reliability, the question has arisen in the minds of many people whether the trait here being measured is not similar in its rigid characteristics to that of such other traits as height. A high index of reliability could not be gotten on a variable trait. Since a high index of reliability does obtain, the implication is certainly present that the trait in question is a stable one. But this would hold only if the instrument were so constructed that it would yield the maximum possibility to reveal range and deviation, and if particular effort were exercised in the testing situations to bring this out — holding, of course, the conditions of testing constant.

Let me illustrate this from another territory. Let us suppose that today we get an index of the load the heart can carry. (There would, of course, be individual differences found in the subjects.) Subsequent retesting might show that the subjects occupied substantially the same rank positions. The index of reliability of the measuring instrument would be high. But it would be exceedingly dangerous to generalize about the character of heart action merely because one were measuring heart load under apparently reliable conditions. What we need to know is how these same subjects would behave in a crisis — where the load upon the heart is excessive. A case of pneumonia would reveal this. It might, thereby, reveal an entirely unexpected and enormous range of potential performance which the test-retest situations failed to bring out at all.

The intelligence test has sometimes been likened to a thermometer. The thermometer, if carefully constructed, is able to reveal deviations in temperature. But there is this difference between current usage of the thermometer and the intelligence test: The thermometer is always employed by a doctor in critical situations — whenever the clinical symptomology reveals deviation from the normal. In intelligence testing just the reverse holds. The residual reliability is not assumed to rest within the instrument, but within the subject. As a consequence, testing conditions are so controlled that deviations of the subjects become difficult to obtain.

Is it possible that this control exercised in the testing procedure, together with learned material, is responsible for the apparent stability of the I. Q.? Or is this constancy of the I. Q. indicative of a something within the nervous system which can be described quantitatively and which is nonvariable?

Variability must be sought for in critical situations and the following conditions must apply:

1. The instrument must be sensitive enough to reveal range and fluctuations in behavior.
2. The subjects must be tested under widely varying kinds of conditions.
3. Nothing should be assumed regarding the dependability of the instrument or the consistency of the subject until there is supporting evidence from

other fields employing other methods of testing, that the consistency in the subject is valid.

Nature, generally, seems to have employed the principle of variation lavishly. Not only are there wide differences between people and structures, but there are differences between the responsiveness of certain organs to stimuli. That any mechanism such as intelligence is so stable that it cannot reflect pronounced change is open to question.

The best answer to this question lies not in the data of the mental testers but in an examination of the question whether the nervous system generally responds to changes in its environment, both external and internal.

Let us now examine the question of whether the nervous system responds to changes in stimuli. Have we any reason for assuming that in the process of evolution the nervous system should have been so evolved that certain portions are protected from deleterious effects that may be operating upon other portions of the nervous system? In other words, does the nervous system behave somewhat as a unit and respond to organic states in general, both benign and malign? There is a mass of evidence in this field to indicate that it does respond to changes in its environment. Space does not permit mentioning this evidence in great detail. However, a few such instances will be mentioned. Let us take the case of blood calcium. Calcium acts as a buffer in the blood. One of its big roles is to keep neural tissue within bounds. If, for instance, the blood calcium drops below its normal level, an increased irritability manifests itself and, at a certain critical point, the individual goes from a stable, integrated kind of performance into the terrific spasms of tetany. Tetany is a state of hyper-irritability of neural tissue, in this particular instance produced by the lowering of blood calcium. Just the opposite holds in the case of excess calcium in the blood, which results in depression of neural tissue. The blood sugar mechanism shows similar characteristics. In the instance of rapid blood sugar depletion, an increasing irritability manifests itself, which will finally, again, culminate in convulsions. In both instances the convulsions are indicative of neuro-pathology and are produced through the changed chemical environment acting upon nerve cells.

Everyone is acquainted with some of the data derived from the general field of the internal secretions. In the study of the glands of internal secretion, whose function is to secrete certain agents essential to life and well-being, one finds instances in which these secretions are definitely and positively related to the performance of neural tissue. Thus, for instance, in the case of thyroid deficiency, one finds a drop in blood pressure, a depression in body temperature, a dry, scaly skin, a phlegmatic emotional condition and a depressed intelligence. Cretinism is associated with mental deficiency. In the case of hyperthyroidism, one has a picture which is quite the reverse. There is an increased temperature, an increased blood pressure, a moist skin, a hyperactive condition and a state of great emotional and even intellectual irritability that can even reach a condition of complete disorganization.

The parathyroid glands, which are closely related to the metabolism of calcium, show an interesting relation to

neural operation. In the case of their removal, an increasing irritability comes on, which finally culminates in tetany and, unless corrected, results in death. There is a mass of evidence on several of the other glands of internal secretion, such, for instance, as the adrenals, where the substance derived from medulla of the adrenals is closely related to the emotional states. Cannon has indicated that this relationship is so intimate that it is really the control agent of the emotions. Similarly, the secondary sex characteristics are closely identified with the functioning of the gonads. In their removal, profound changes in personality, and perhaps of intellect, occur. The pituitary, which is often referred to as one of the master tissues of the body, secretes not one but several different secretions, all of them vitally important. Disturbance of the pituitary gland can produce either a Tom Thumb or a Goliath, to mention only one of such influences. These various influences upon human behavior which result from the functioning of glands of internal secretion, are so precise and definite that one can state that their influence is general and affects all tissue. As a matter of fact, one could well raise the point whether these mechanisms are not so primary in importance that they constitute major controlling agents.

It is well known, in biological circles, that not one but many different kinds of agents can affect neural functioning. Thus, we have the various drugs, absinthe, hashish, mescal, caffeine, etc. Such agents have a very specific effect upon behavior. Some have a depressive effect upon neural tissues. Others have an irritating or exhilarating effect. Caffeine, for instance, has a distinct facilitative effect upon many neural operations, and this even extends into the strictly intellectual realm. Caffeine can even speed up associations.

Again we have evidence to indicate that such an agent as calcium may have some bearing upon mental processes. Thus, the Jaensch brothers, in their studies on the eidetic phenomenon, have come to the conclusion that a higher incidence of eidetic people is met with in those portions of Germany where the lime content of the water is low. They also concluded that the eidetic phenomenon disappears or subsides with the administration of calcium and cod liver oil. Eidetic imagery is a peculiarly precise form of positive after-imagery. As such, it is closely related to mental life in its more complex forms, since imagery is an important aspect of high mental bahavior.

Finally, there is ample evidence to indicate a close relationship of some of the vitamins to neural functioning. In beri-beri, or vitamin B deficiency, a real psychosis is manifest, and can easily be prevented by an adequate diet. Pellagra, long thought to be due to the use of a too restricted diet of mouldy corn, has upon recent data shown indications of being caused by a vitamin deficiency. Such instances, and many others, add to the evidence that neural tissue is responsive to disturbed states of metabolism, and the evidence is good that this disturbance can extend to the higher mental processes.

Evidence such as the above seems to demonstrate responsiveness of neural tissue to change in its environment, particularly its chemical environment. It has even been implied, in the field of biology, that we might do well to scrap

our old theories of neurology, and instead of referring to the integrating mechanisms as neural mechanisms, that we use the term chemico-neural mechanisms. Such a point of view has much to be said in its favor. It very definitely implies that the total living organism is an integrated agent with each mechanism nicely bound with every other, and all of them working as a totality, presumably to accomplish the best possible adjustment of the individual to the exigencies of the environment. If such should be the case, then this dichotomy between intellect and emotion, this insistence that intelligence is something apart, something not responsible to other mechanisms which are influencing the rest of the organism, is open to grave question. It would thus seem that the neural tissue, including that portion responsible for intelligence, cannot be regarded as autonomous and independent. Rather the suggestion is present that the organism is highly responsive to environmental changes placed upon it and that it responds to those changes through changed behavior.

Viewed from this standpoint the range of performance, or variability, in the various mechanisms is immense. Adequate stimuli and testing situations are, however, necessary to reveal the variability. This corresponds with what we know about learning. Learning in process is highly variable, subject to a multitude of influencing agents and conditions. In fact, it is doubtful whether any other mechanism reveals such flexibility as learning does.

In view of the harmony that exists between learning — which is an expression of neural performance — and the responsiveness of neural tissue to influencing factors such as blood calcium level, the blood sugar level, the presence or absence of the vitamins, and the state of the glands of internal secretion, the conclusion is forced that neural tissue is responsive to change in the stimuli which activate and, perhaps, control it.

Why should these various physical agents, which manifest themselves by influencing all other tissues, seem to have no effect on those neural tissues responsible for intelligence? Clearly, the problem is a knotty one. Either they do influence all tissues of the living organism, or else certain tissues, such as those responsible for intelligence, are exempt from their influence. It is hard to conceive how any tissue could escape the influence, let us say, of calcium, or of the secretions of the endocrine glands. We have no evidence to indicate that any tissue does escape this influence. This being the case, why do we get such a high degree of reliability on test-retest situations? Instead of putting our dependance upon a reliability of the test, which we are using, we should perhaps be turning our attention to the one big question, namely, why these tests are reliable, and why, when variation is so apparent in the rest of the organism, it should not be equally apparent within the realm of intelligence.

Is it possible that this high degree of reliability results from the fact that in our test-retest procedure we tend to sample within short periods of time rather than at long intervals, and as a consequence may tend to rule out any extreme variation for the mass of subjects? This is a possibility that needs be explored by further research. There is, of course, the other issue raised earlier, that the reason we get a high degree of

reliability is because we are dealing with over-fixed material, which being stable in character, tends to show little variation.

Now, what can we say about validity? Validity, as defined in the test field, is usually stated as evidence that the test is measuring what it purports to measure. In the intelligence test field, this would mean that intelligence tests measure intelligence. Measures of validity are always somewhat indirect in character and particularly so in a field such as intelligence testing. Here again, strange to say, we go back to the layman's position. Laymen have always believed that the children who learn rapidly are the brighter children and hence the more intelligent ones. They have always believed that the speed of reaction in acquiring information is a measure of intelligence. In other words, if an individual learns quickly he is intelligent. Deeply inbedded in the concepts of the great mass of people is a rather firm faith that speed of reaction and freedom from errors are two very important indices of intellectual operation. There is a third point of view closely associated with the error criterion—namely, that people differ in what they do and that there are certain performances which some people can never acquire regardless of how much effort they put upon them. Thus, for instance, a feeble-minded individual could not learn calculus or become a Greek scholar.

In our search for measures of validity we have, in a sense, utilized the thinking of lay people. We correlate test performance against academic performance, against speed in other operations, against freedom from errors as the individual performs in other situations, against achievement in certain complex fields which we have reason to believe can be mastered only by people of good intellect, and finally against subsequent case histories. In such studies, the fact comes out with consistency that there is a postive correlation between performance on an intelligence test and these other measures. There is a positive correlation between achievement on an intelligence test and achievement of a child in the academic environment. It is true that this correlation is higher for grade children than it is for high school children, higher again for high school children than it is for college students, but the correlation, even though small and lacking in any high predictive value, still, nevertheless, is positive in character. Correlation, of course, does not indicate causal relation. It merely indicates concomitant variation which, put in simpler language, is that the two variables are varying in the same direction at the same time, and at a none too disproportionate rate.

But here again one must go back and examine this very fact of variation. If we are testing intelligence, and if the academic environment is supposed to have some degree of constancy in it, why then should the predictive value of a test be greater for performance within the elementary field than performance for the same subjects within the college field? This is usually explained by saying that, after all, performance is conditioned upon a great many factors other than intelligence, and that it is the interplay of these factors upon the subject that produces the variation. This may be true, but, if so, is this not again the introduction of the implication that intelligence is something other than these other factors, emotions or what-

not? In other words, are we not back again to the old idea of a dichotomy between intellect and emotion?

Enough solid data exist to call into question this dichotomy. If intellect is stable, then we need to look first of all to the question of why it is so. This compels us to scrutinize carefully the instruments which we are employing in the measurement of intellect.

At this point I should like to mention two facts which anyone given to overgeneralization in the test field needs to consider. The glands of internal secretion exert a profound effect upon all tissue. Indeed, the effect is so primary that one could even maintain that these agents are almost dominant. These various glands of internal secretion appeared relatively early in the process of evolution and have never been replaced in the process of organic economy. They are highly differentiated one from the other, but the same gland is not differentiated in function in different species. Thyroid deficiency in a human being can be corrected through the administration of thyroid substance from a sheep or a pig. This wide interchangeability from one species to another, together with the rather general dominance which such an agent as the thyroid seems to display, suggests that neural tissue is neither protected from influence nor dominant. If such be the case, there should be a greater degree of variablity present than is met in test results.

Variation is so constant and its implications so broad in the field of biology that biologists rather generally have come to expect it. Thus the kidney can secrete many times its normal amount with no resulting pathology; a great share of the pancreas can be extirpated without the appearance of diabetes. A considerable part of the thyroid can be removed without a resulting thyroid deficiency. The heart meets emergencies by carrying a vastly greater load than it ordinarily carries. Such examples, and many others, demonstrate the great flexibility and potentiality for deviation in organic mechanisms. Why should the tissue responsible for intelligence be different?

Mental testers apparently do not see the humor of the fact that they alone, of all workers in biological science, are so precise in their techniques that they can measure and find not variation but constancy within the individual. And this in spite of the fact that they measure intelligence, not directly, but indirectly, through the avenue of learning! Yet a careful examination of the way we measure learning and the criteria which we employ should compel, it would seem, skepticism that psychology, in any of its fields, is able to speak with authority in the matter of precise quantitative measurement. Are the psychologists better technicians than others who attempt measurement within the biological world, or does the difficulty lie in a faulty instrument?

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In closing this discussion, I cannot help pointing out a few of the general implications which seem to characterize living tissue and behavior.

1. In the process of evolution, mechanisms and their functions show no dichotomies. The higher mental processes have emerged out of rather vague, undifferentiated feeling states. The dichotomy between intellect and emotion rests upon no sound evidence; it is an abstraction and has no real

basis in fact. Were one to remove from the thinking process the cause for thinking—which is the drive or motivation—thinking would cease and the individual would go to sleep. If this be true, then failure of the emotional states to influence test results suggests that the test is at fault in that it is not sensitive enough to reveal the influence of a vital process.

2. Structures and mechanisms are broad in character and must not be conceived as atomistic units, such as nerve cells, but rather as parts of a total interlocking mechanism. If there is any significance in all this, it is that were this interrelationship absent, life would be impossible. Neither the organism nor the environmental world is constant. Such being the case it is doubtful whether evolution could have selected mechanisms such that they specifically could meet the exigencies of a constantly changing environment, except through the lavish use of the principle of variation. Variation is primary; without it the organism would be quickly annihilated. Exceptions, such as those derived from intelligence testing, do not fit the pattern of biological design.

3. Learning fits well into the design observable elsewhere in the organism, through the fact of its variability and its responsiveness to many influencing agents. Are learning capacity and intelligence synonymous and, if so, are we to search for intelligence through the procedures we have been employing, or should we begin a new attack with the emphasis placed upon change rather than stability? In such an attack our present measures of reliability and validity would be worthless.

   Over-learned material is low in "feeling tone" as well as in potentiality to deviate. Such being the case no surprise should be experienced at the relative stability of intelligence as we measure it. But the intelligence in which everyone is interested is the responsive kind of action capable of being mobilized to meet a sudden and unusual demand. In such unusual demands survival or annihilation are imminent.

4. Psychologists who practice abstraction of content and test with specially devised instruments are following a sound procedure as long as their data show harmony with the great principles of biological design. When those data show lack of harmony, one needs to be wary.

5. The factor of safety within the organism is great. This means that the organism's potentiality for adjustment is great. An atomistic, predetermined, rigidly stable intelligence may fit the current theories of psychology. It is out of place in the rest of the biological world. And it is becoming increasingly more so as our knowledge of chemistry increases.

6. Facilitative agents are few in the mental realm. Yet there is more than a suspicion that some day the means may be available to get the most out of neural mechanisms. It is not impossible that intelligence can, in the future, be expanded under the compulsion of precise chemical controls. Caffeine speeds up associations. Better facilitative agents may yet be discovered. If such were ever to be the case our rigid, atomistic theories of intelligence, as expressed best in the writings on genius and heredity, will have gone with the wind.

7. And finally, need I call the attention of the reader to the fact that there are not a few psychologists these days engaged in a grand "bull-fight" over the constancy of I.Q. question? Feeling runs high and the words are sharp and bitter. Are we to conclude that that feeling is an expression of emotion, and may even, perhaps, be mobilizing the thinking? If so, glands and nerve cells are strangely mixed and interdependent. How much more convincing psychologists are when engaged in a fight than when spinning their theories!

INTELLIGENCE AND DEMOCRATIC LIVING

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The rationalization for a feudalistic or oligarchic society has usually consisted of an appeal to the doctrine of the inherent superiority of the privileged groups over the underprivileged. The prerogatives of noble birth were thought to be based upon the natural sanction of an inexorable and selective heredity. From the doctrine of the divine right of kings it was but a short step to the doctrine of the divine right of property and power. In our own time the antidemocratic forces of the world have identified themselves with that superlative form of psychological determinism, the myth of racial superiority.

Most common among the arguments offered in defense of the *status quo* has been the widely accepted theory of the constancy of the I. Q. The exploitation of the Negro, the unskilled industrial worker, the sharecropper, and the tenant farmer, indeed, the destitute and the outcast everywhere, has been defended on the assumption that the plight of these underprivileged multitudes is inevitable in view of their incompetence or thriftlessness. The new evidence which has revealed startling increases in I. Q. in favorable learning environments now discredits the assumption on which the defenses of economic feudalism were based.

The prevailing conception of intelligence has been unsuited to the needs of a democratic society, not only because it has given support to an aristocratic social theory, but also because it has emphasized individual development in a period of social interdependence. We have witnessed bright and superior pupils pursuing trivial, irrelevant, or remote subjects and exhibiting a complete indifference or ignorance concerning their own personal goals or the crushing problems of society. Physicians brilliantly qualified for their own profession have assumed moronic attitudes toward the critical problems of public health. Reactionary pronouncements have been issued by pompous shirt fronts in administrative offices and college and university chairs, whose I. Q.'s were undoubtedly well above 100, but whose knowledge of the contemporary scene was derived from the *Saturday Evening Post*. If a number of recent polls are to be believed, the social judgment of many groups of laborers is superior to that of some university faculties.

This situation is not attributable entirely to our antiquated curriculum. It results in no small measure from the high degree of individualism implied in the traditional concept of intelligence. The growth of democracy consists not so much in the functioning of individual intelligences, high or low, as in the widespread sharing of intelligence. Our day by day decisions, in the family, in the community, and in the nation at large, are democratic and intelligent in so far as there is mutual understanding of purposes, and the free and effective intercourse of information and ideas. Such intercourse has been conceived by the

traditional psychologists as belonging to the category of nurture rather than nature, but the inseparability of the two in the functioning of intelligence merely demonstrates the sterility of the hereditarian conception of the I. Q.

The social inadequacy of the I. Q. as a professional instrument is best illustrated by an examination of the crises in our economic life. Our business and industrial leaders exhibit, on the whole, a high degree of intelligence as measured by standards of individual efficiency in the management of their respective private enterprises. Certainly it may be assumed that the proportion of high I. Q.'s among business leaders is greater than that among the rank and file of workers. Yet in acting upon their individualistic judgments these leaders have been unable to avert the near-collapse of the business structure. A greater measure of social intelligence, the product of group thinking, on the part of all interested parties including workers and consumers would have gone far to stave off individual catastrophe for the victims of the crises. Yet it is just such group thinking which is most commonly resisted by individuals who would perform nobly on intelligence tests.

Thousands of American teachers have rightly revolted against the regimentation of the traditional school. In doing so, however, many have established standards of performance which would increase the individual efficiency of pupils without altering the unsocial character of the life of the school. They have set children in competition with themselves or with each other, focusing their attention upon individual progress quite apart from their growth as social beings. They have converted intelligence quotients into achievement quotients, and have measured performance in terms of the "power line". Some have sought to individualize instruction by means of the contract method, a device suggestive of the yellow-dog contract in industry. Notwithstanding the sliding scale and the adoption of the principle, "From everyone according to his ability," it has been every man for himself and the devil take the hindmost.

With the discovery that children in any typical group represent a wide distribution of intelligence test scores, others have hastened to classify children in groups thought to be roughly homogeneous. Notwithstanding the fact that homogeneity cannot be achieved simultaneously with respect to all significant characteristics of children and that homogeneity in even single characteristics is extremely temporary because of variability in rate of development, they have sought to achieve teaching efficiency by means of a relative uniformity of the pupil personnel. In so doing they have widened the breach between school and life by reducing or eliminating the opportunity for thinking and action in typical social situations. The unconscious objective of this procedure is the mastery of knowledge and skill unhampered by the struggles and failures of slower learners or the discouragement of unsuccessful competition with more gifted classmates. If the objective of education is conceived to be more effective participation in the life of a democratic society, homogeneous grouping, special vocational classes for slow learners, and special schools for superior children are at best devious and highly indirect means of attaining the goal.

The segregation of children accord-

ing to intelligence levels constitutes a virtual abandonment of the democratic way. Decisions in a democracy are reached, not through the paternalistic leadership of the "bright" pupils, nor by a pooling of judgments arrived at independently by the bright, the mediocre, and the dull. They are made through the clash of opinions of groups and individuals after analysis of the relation between individual interests and group needs or — in the larger arena of life outside the school — between regional or class interests and national needs. In the interplay of ideas the individual experience is important because it contributes to the building of social intelligence and the direction of social movement quite apart from the relative levels of individual intelligence. While it is quite true that the school cannot be an exact replica of adult life, it should reproduce those significant aspects of adult life which are related to the basic objectives of the school. Certainly the formation of group judgments and group opinions in diverse constituencies would seem to be vitally related to the major task of the school.

The conditions of living in our modern inter-dependent world are determined, in the main, by group thinking and group action. Corporate enterprise, community projects, governmental services, and the activities of labor unions, churches, clubs, schools, and other organizations with which human beings are directly or indirectly associated, fashion the environment and condition the behavior of men in ways which transcend the efforts of the ablest individuals. Yet, so great has been the inertia of the school that practically its entire program has been focused upon the proficiency of the individual. Grades, promotions, credits, examinations, and academic honors have accentuated the quality of individual performance and have encouraged the learner to pursue individual ends with relative indifference to the welfare of the achievement of the group. The question of major concern to the educator has been: Does the student's achievement measure up to his ability? Only secondary attention has been given to the question: Are the student's energies directed towards the achievement of worthy group objectives?

An illuminating example of the contrast between the functioning of the individual and of the social intelligence is the shift from the traditional formal debate to the forum or the informal panel discussion. The formal debate gave opportunity for the full exercise and display of the individual intelligence, and success was measured by the effectiveness with which the individual defended a previously established thesis. The process was competitive and the object the vindication of the individual's real or professed conclusions. In the panel discussion there is a cooperative effort to arrive at defensible conclusions after consideration of every possible view. The object is the cultivation of a collective intelligence in preparation for group decisions. The individual makes his contribution, not to attack or defend, but to test or to modify group thinking. The panel is pedagogically valuable because it gives dignity to the thinking of the humblest, and checks and chastens the dogmatism of the arrogant.

The new conditions of social living are calling for newer techniques for the promotion of participation in group de-

liberation. The principles of parliamentary law define the rules under which individuals and minorities may attempt to secure the acceptance of their views by the majority. They are designed for the regulation of a competitive struggle in which the objective is a parliamentary victory rather than increased understanding. The aim has been the arbitration of disagreements rather than the achievement of maximum agreement through non-partisan group study. Certain of our social institutions are making the adaptation to the new social needs. Some of our juvenile courts, for example, have dispensed with the procedure of debate between opposing counsel and the exploitation of technicalities, and have substituted boards of psychiatrists, psychologists, educators, and social workers for the purpose of getting at facts rather than winning a tug of war. Professor Floyd Reeves reports that in the building of Norris Dam workers were encouraged to contribute suggestions for the improvement of the construction process, with beneficial results in the saving of time, effort, and money.

All this is not to say that the mental ability of the individual is of no importance. But the individual intelligence operates in a social environment which fundamentally influences the effectiveness of the individual intelligence, and which is in turn conditioned by it. Both the bright and the dull grow through social intercourse and both are indispensable to the shaping of the social intelligence. We cannot improve the quality of group opinion or social action without studying carefully the composition of forces arising from the interaction of individual minds.

The ability to participate effectively in the building of group intelligence is not automatically acquired. It is acquired only through abundant experience in group thinking and group planning. It calls for a systematic program conceived by a school organization deliberately aiming at the enrichment and the strengthening of social intercourse. It involves the building of skills and attitudes and the mastery of techniques much more difficult to learn than the linguistic proficiencies and the individualistic scholastic accomplishments that are the stock-in-trade of the archaic curriculum now prevailing. Such a program would aim at tolerance and understanding of divergent viewpoints; at the interpretation of the desires and sentiments of the less articulate by those who express themselves more readily; at critical listening and free expression on the part of the less gifted; and above all at a vital concern for group welfare and patience with the peculiarities of group behavior.

Promoting a more intelligent group life gives new importance to the role of communication in the educative process. Not merely a heightened facility and precision of expression, written and oral, within the group, but wider access to diversified sources of information for members of the group and the acquisition of other than linguistic techniques of communication are essential to the growth of the intellectual life of the group. At present the language program of the typical school is bogged down by the study of the technicalities of grammar and mechanics. Even when language is recognized as a social activity, the ultimate objective remains the achievement of poise or individual

distinction or individual efficiency in social situations, rather than the mental health of the group.

In periods of hysteria and tension, groups of people who are individually rational and responsible beings often act blindly in response to emotional appeals. It has been commonly assumed that such social behavior is an inevitable characteristic of mankind in the mass. But those who accept this assumption overlook the fact that social as well as individual behavior is learned, and that our entire educational program has been concentrated upon the modification of individual behavior and that even the rudiments of education for social control are yet to be developed. The ability to read newspapers critically, to evaluate radio programs and motion pictures with a wholesome degree of skepticism and to recognize propaganda devices are only a partial approach to the problem, because they are concerned primarily with the responses of individual learners. In the months and years to come we shall be relatively helpless against those who will seek to control mass opinion, chiefly because we have not learned the difficult techniques of thinking and working together through the sharing of intelligence. We are defenseless because all the intelligence quotients together do not add up to a minimum collective intelligence.

The objective of rationality and responsibility in group life does not preclude adequate provision for individual differences. Upon the contrary, uniformity of experience on the part of the members of a society, whether in the school room or in other social institutions, is fatal to a high degree of social intelligence. Group thinking is enriched through the diversified contributions of individuals who differ widely in their social and economic backgrounds, their insights into social and cultural realities, their play and work interests, their reading experiences, and their personal enthusiasms. For that reason the use of uniform textbooks and uniform assignments, even if they were not a hindrance to effective individual learning, contribute materially to the impoverishment of group life. For that reason too the achievement of uniformity through ability grouping, which is an effort to solve the problem of individual differences by escaping them rather than by providing for them, is unacceptable in a school undertaking to educate young people for life in a democracy.

If we are to promote genuine growth in the capacity of the learner to contribute helpfully to group thinking and planning, we must build a school environment with diverse sources of stimulation. In a vast number of our schools today there are classrooms so crowded with children that there is no room for books, not to speak of reading alcoves or attractive book displays. There are classrooms all over the United States even today with not a single magazine to be found, no newspaper racks, no files of clippings, picture materials, and pamphlets. There are only rows upon rows of children, textbooks which can be demonstrated to be unsuited to at least fifty per cent of the pupils, and a harassed teacher who is obliged to resort to military discipline to maintain a semblance of order. If we could so organize our schools that children would have abundant opportunity to explore their communities, to have first-hand experiences with living things and

with the physical world, to engage in diversified types of language and play experiences, to evaluate radio programs and photoplays, and to participate actively and freely in group undertakings, we should be laying the basis for a meaningful approach to the building of individual and social competence.

A favorable learning environment provides opportunity not only for many different kinds of first-hand experience, but it surrounds the learner perpetually with ideas conveyed in spoken and written language by radio, by the conversations of companions and guardians, by books and pictures and songs, posters and slides and films, phonograph records and speeches and plays. But the typical school is operated on the basis of an economy of scarcity rather than abundance, so far as ideas are concerned. Spoken language, other than that conducted under the teacher's baton is a misdemeanor, and unscheduled movements from place to place are a major offense. Ideas derived from sources other than the adopted text are regarded with suspicion or rejected as mischievous digressions. This at least is the picture presented in our great urban school systems. The fortress of educational conservatism may be cracking here and there, but the foundations are still intact.

The pressure for uniformity and conformity and the preoccupation with sterilized subject matter set out in advance is motivated primarily by a fear of intelligence. Those who unsuccessfully opposed the organization of free schools for the enlightenment of the masses are reincarnated in community and educational agencies which now safeguard children and youth from the perils of thinking about the significant issues of our time. They are aided by some administrators and teachers who desire to escape from the hazards and the pains of facing the complexities of life. In the ivory tower, furnished with well-worn units on the private life of the Romans, the diet and costumes of the Puritans, and the case of personal pronouns, the noises of the market place do not penetrate. In a recent article in a professional magazine enumerating the day by day activities of a high school principal the one recurring item which seemed to overshadow all other activities was the preparation for a spelling contest.

The democratic society is built on the assumption that the rank and file of the people can participate in the control of social movement. It implies a faith that the common man can learn to acquire and utilize the facts and insights needed to assume the responsibilities of joining with others in the shaping of the physical and social environments. Any evidence such as that recently produced at the University of Iowa and elsewhere to show that man by taking thought can add to the intellectual stature of the younger generation reinforces that faith in the future of the democratic adventure.

SIGNIFICANCE OF THE INQUIRY INTO THE NATURE AND CONSTANCY OF THE IQ.

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A history of civilization might well be written in terms of man's changing conception of himself. Certainly his conception of his own nature, the possibilities and limits of his growth, determines in no small way his attitudes toward war and our economic system, his conception of individual, class, national and race differences, the nature and role of leadership, expertness and authority. His understanding of his own nature and its possibilities will define his attitude toward human progress, the improvability of human nature, his confidence in people and their intelligence and in the democratic concept of morals and society. His conception of the nature and function of education and its relation to democracy and progress, and his idea of the nature of science and its relations to the evolution of human culture are intimately involved in his theory of intelligence and human nature. Minority groups, "inferior classes," "backward peoples," the "lower" orders are all expressions of a theory of intelligence and its distribution.

The whole question of predestination of individuals, of classes, races or nations, whether this predestination is divine, biological or cultural is closely tied up with one's beliefs about human nature. The problem of the I.Q. is, therefore, one of the more crucial problems of our culture. Are individuals, classes or peoples destined to live within the limits prescribed by their genes, or are their futures dependent upon cultural factors over which they may have some measure of control themselves? If the latter, to what extent can they control these factors individually or collectively? What difference would it make if men not only could exercise some control over the conditions that shape their future, but likewise realized that fact?

Man's confidence in his own and society's possibilities is dependent upon how he conceives the limitations of his own growth almost as much as the actual limitations themselves. His conceptions of his own possibilities and limitations are historic facts of great importance for they exercise such great influence upon every aspect of social and educational policy. For that reason the inquiry into the nature and constancy of the I.Q. is of profound significance for every aspect of life. It would be difficult to point to a single more important problem confronting educators and statesmen alike. The outcome of this inquiry will have reverberations throughout the entire culture.

CONTRASTING CONCEPTIONS OF HUMAN NATURE AND OF INTELLIGENCE

We can more easily point out the significance of this inquiry if we outline two contrasting psychologies in order to note what difference they make in social and educational policy. We will take two theories as representative of two extreme positions although there are obviously many shades of psychological theory in between. On the one hand we

have that general position which looks upon mind as an essence, spiritual substance or faculty of rather specific limitations of powers. Mind varies from individual to individual, class to class, and people to people in amount, quality or power. Its improvement is purely a function of exercise which, however, does not affect its original power or amount, but simply develops what is inherently present. Hence an adequate test would reveal its inherent power, quality or amount, because its limits are set in advance by nature, i.e., the genes.

"Backward" and "inferior" individuals, classes or peoples are backward or inferior because they lack the essential power to acquire and advance within their own culture as individuals, or to progress as cultures. Their amount of intelligence accounts for their status socially, economically and culturally. Dominant individuals, classes or peoples are so because of their natively superior inventiveness, originality or intelligence. Man's weaknesses, on the other hand, are to be attributed to his own inherent limitations, the "sinfulness" of his nature. War, poverty, disease, crime, injustice, superstition, greed, persecution, these are all expressions of his original sin, his natural limitations. According to this point of view it might be argued that modern civilization is confronted with the impasse of having become too complex and difficult, too involved for intellectual and moral capacities of the masses of mankind.

According to this position human nature is relatively unchanging. Man inherits through his germ plasm a rather complete pattern of behaviour and personality. Learning is supplementary to this inherited equipment but scarcely touches its basic structure and pattern. Hence such institutions as war, imperialism, economic exploitation and struggle, sex, class and race differences and relationships are inherent in the original nature of man. Education may give a certain gloss and finish, strengthen some and inhibit other traits, add an equipment of skills and information. But basically what education can do is limited by the original equipment with which we begin.

Progress, therefore, from this point of view may consist in a continuous accretion to the cultural equipment and materials of a people, but has little meaning for human nature as such. In biological terms this point of view gives support to the doctrine of original sin. Man inherits natural limitations and deficiencies which render him ever liable to social and individual digressions and frailties. Crime and delinquency, poverty, injustice, war, ignorance, prejudice, intolerance, greed, and vice are his natural endowment. Education, religion and the state have as their primary responsibility therefore the subjection and control of these innate tendencies. Since these are natural, innate endowments, authority, discipline, and coercion must ever be relied upon to hold them in check, or society itself is undermined. Since man of necessity must live in society, obedience to authority is imperative to any form of human existence.

Those who are superior in any sense are in that respect stewards of the inferior. It is their moral obligation to maintain their authority and demand respect and obedience. Parent, teacher, priest, employer, official and expert must protect their status and dignity lest their subordinates take advantage of

their laxity and evade their authority. Thus the exercise of authority is as much an obligation as is obedience to it. A certain cynicism with regard to human nature is therefore the beginning of wisdom, for without it authorities are in constant danger of relaxing their vigilance and control.

Since the masses are so deficient in intelligence society can be controlled or improved only by an elite. While this elite may engage in criticism it is exceedingly dangerous to permit this criticism to extend to the masses. On the contrary they must be controlled by fictions, myths and dogmas which are held incontrovertible. Education and learning for the masses must consist in the acquisition of the information, beliefs, attitudes and skills essential to their status and role in society, "to the position in life to which God has seen fit to call them." In education as elsewhere fear, reward, punishment and discipline play a central role. It will be seen that education and progress have very definite limitations. Democracy is a chimera, a false and dangerous ideal which may threaten the very foundations of civilized life.

The ultimate consequence of such a position is the necessity of turning to other sources of authority and control than human intelligence, for obviously this limitation and inherent sinfulness of man applies to all classes and persons. Man must, therefore, turn to divine guidance and inspiration. A religious institution is the obvious answer to this need. Its doctrine, its dogma of faith and morals, its infallibility based upon revelation and inspiration, give a sanction to authority which make it an imperative guardian of human life and conduct. Without such access to authority and wisdom beyond the human, man lacks the ultimate sanctions essential to his own well-being. The church, therefore, has responsibility not only for the religious life of a people but equally for their education, training, and control in civic matters.

It is true that not all who hold this theory of mind and intelligence accept the social implications noted above. However, there is an old saying to the effect that he who says "a" must say "b." Having accepted the theory that human nature is biologically determined, that mind is an entity or faculty limited in its growth to a biologically preestablished pattern, one must follow through to the logical conclusions. If research eventually establishes the validity of this position social and educational policy must be guided accordingly.

A Functional Theory of Mind

A contrasting theory of human nature and intelligence sees man as biologically continuous with other animals, differing from them in possessing the anatomical and nervous structures basic to the use of tools and to speech. The biological variants basic to these two functions give an entirely new direction to the subsequent course of the evolutionary process. With speech and tools man developed material and social cultures. Survival is no longer a merely biological and individual affair, but becomes supra-organic, cultural as well as biological. Survival values and capacities belong to the culture and the group very much more than to the individual. Individuals are very largely fashioned by their status and role in their culture. Cultures themselves have their distinc-

tive histories and physical settings which largely account for their survival values.

Another great distinction between the biological character of man and of other animals may be found in the differences underlying their inherited behaviours. Other animals seem to inherit relatively specific behaviour patterns, while in man we find great biological indetermination. The patterning of behaviour in man seems to be dependent more largely upon learning, habituation and the canalization of the culture. While man creates cultures, cultures as truly fashion men. What may be instinct in other animals seems in man to be a function of habit and learning in a social context which supplies the patterns.

According to this theory, intelligence, instead of being an original essence, entity or faculty, is a quality of learned behavior. Everything we think, feel or do, leaves some trace in our behaviour, and as a consequence we think, feel and do differently. This difference in our behaviour we call learning or habit. By virtue of habit experience becomes cumulative and conserving. Habit may vary in quality from the extreme of routine, repetition, rigidity and automatism on the one hand to the other extreme of flexible adaptability, sensitivity and thoughtful responsibility. The quality of habit depends upon the circumstances under which it is developed. To the degree that learning and habit are the product of pure drill, repetition and authority, they are blind mechanisms. They possess man even more than man possesses them. On the other hand, to the degree that behaviour in a situation is thoughtful, sensitive and reflectively responsible, resultant habit, the learned increment of the situation will be correspondingly flexible and sensitive. In one instance there is response to a physical stimulus, in the other there is sensitive interaction with the meanings of a total situation. To the degree that habit is flexible, sensitive to meanings, behavior is intelligent. We see this difference between intelligent and routine habit when we compare progressive experimental adaptive behavior with behavior that is set in a rut, old fogyish, the slave of routine and convention.

Intelligence grows with exercise. The growth is not like that of a muscle but is creative, continuously developing new powers and insights. It grows not by continuous accretion of new elements and factors but by continuous reconstruction and transformation of existing powers and tendencies. We could probably clarify the concept of intelligence if we were to discontinue the use of the noun and use only the verb, adverb and adjective forms of the word, since it is not a quantity or entity but rather a function and quality of a process. Such words as *thoughtful, reflective, experimental, intelligently, deliberately, thinking* and *experimenting* more nearly convey what is involved.

Intelligence in this sense is not only a function of problematic situations, it is also a function of social cultural situations. For all that mind is exploring and experimental, it explores and experiments within certain broad limits set by the group and cultural life. What a man may consider as problematic, the way he may attack a problem and the equipment he will bring with him in dealing with it depend to a very large measure upon the culture and group life of which he is a part. Thus man may expect to

achieve increasing control over his own evolutionary process. As he discovers the influences of group life upon the character of individual development, as he learns how to control those elements in the culture that affect his own growth, he is increasingly able to direct his own subsequent development. The establishment of schools, the use of printed materials, control of radio and movies are most obvious instances. The character of instruction within the schools themselves is not so obvious but probably more important. If this point of view is correct we can vastly enhance the intelligence of our people by developing that *kind* of school that deliberately fosters the experimental, thoughtful, deliberate action, that sees learning as a group, active, creative function.

If this concept is correct it is not human nature that resists change but rather human institutions which resist. If human nature is flexible, deriving its pattern from its culture, then we might expect that a proper reconstruction of our culture might greatly affect our attitude and conduct with regards to war, poverty, disease, crime, ignorance and vice. Where the former theory counsels a conservative if not reactionary social outlook, this theory encourages a progressive, experimental, reconstructive attitude. Where the former sees progress as a precarious, superficial phenomenon, the latter sees progress as the natural consequence of the growth of intelligence and education. To the degree that we learn how to release the capacities of men and then deliberately reconstruct the conditions under which people live so as to permit this release to take place, man's destiny is in his own hands.

Faith in the possibilities of human nature and in its almost unlimited capacities for improvement, combined with the theory that intelligence is a function of freedom and responsibility in dealing with problems leads to an anti-authoritarian democratic outlook. The central problem both educationally and socially is one of how to initiate and develop such agencies of intercommunication that individuals and groups may adequately identify themselves with the larger culture and cope reflectively with its problems. Anything which tends to set up isolations and to clog the channels of communication from this point of view becomes a blasphemy against the human spirit. Coercion and arbitrary authority, circumventing a thoughtful, experimental and responsible behavior truncate intelligence and stifle its growth.

Leadership whether that of parent, teacher, priest, lawgiver or expert has vastly greater responsibilities according to this position than in an authoritarian society. For they now not only are authorities in the sense of having more experience in a given area, but they must be skilled in releasing the creative powers of those to whom they are authorities. Guidance becomes the art and process of provoking a thoughtful responsible attitude toward situations and helping individuals and groups learn how best to make use of their own and the resources of their culture in dealing with them. The dogmatic and authoritarian attitude prevents the development of a critical intelligent capacity to make use of these resources in their fullest degree. On the contrary it tends toward the development of blind, routine, mechanical habits which can

respond only to very narrow meanings, destroying a sensitive, flexible adaptability, a deliberate, thoughtful responsibility in the presence of novel situations.

If human nature is a function of social experiences, then the inequality of classes, races and cultures may be explained in terms of history and culture rather than biology. Inferiority is something to be studied and remedied rather than to be treated with cynicism or condescension. If we acknowledge the social character of personality, then inferiority of any individual or group becomes a liability to the larger group or society. Under the former theory inferiorities might appear necessary evils, since someone had to do the "dirty work" of the world. This is another way of saying that the "superiority" of individuals and groups demands those whom that "superiority" can exploit. It is possible that a measure of unconscious rationalization may be responsible for the assumption that this inferiority is irremediable, since to remedy it would remove the grounds for superiority and exploitation.

Since intelligence is a function of initiative, responsibility and freedom in group life, a cumulative growth of meaning resulting from deliberate action, democracy is imperative to man's fullest growth. Progress then means, not the accretion of cultural materials so much as the continuous cumulative, creative growth of intelligence both socially and individually. We must, therefore, cherish above all other values, those circumstances and conditions that liberate man's creative powers. We should similarly avoid as the pestilence those circumstances which stifle them. Authoritarianism, conventionality, "respectability" and persecution are the great Bads of human life, for they frustrate intelligence at its source.

Education according to this theory is a world and race building function. It means the creation of circumstances that call forth initiative, responsibility, conscientiousness, sensitivity, that cultivate judgment and refine sensibilities, that awaken and create identifications of the self with others, that build insight regarding the forces that impinge upon society and the individual and competence in their manipulation. Accordingly every institution, custom or practice must be continuously evaluated and reconstructed in terms of its educative influence, its consequences for personality, disposition and intelligence. Democracy and intelligence are therefore correlative terms. Progress is the cumulative growth of society in intelligence and democracy. Since the three terms refer to relative qualities of life — that is, qualities that exist in degree and not absolutely — we must think of them all in a dynamic sense. They exist together and vary each as the other.

Science is the method of intelligence, disciplined and developed in its attack upon certain subject matters. When we note the contrast in our capacity to deal with the physical aspects of the world between the sixteenth and twentieth centuries, we get a suggestion of the possibilities of human life as our intelligence in matters of social relationships becomes similarly disciplined and developed. We see similarly certain basic cultural developments essential to the growth of social intelligence. Vested interest, authority, dogma, conventionality, snob superiority must give way before respect for the powers of intelligence, opening the channels of commu-

nication, breaking down isolating barriers between groups, cultivating initiative and responsibility among *all* men. Agencies of communication must be controlled in the interest of this social intelligence rather than in the interest of profit or as house organs of special interests.

Little has been said about intelligence testing and the I.Q. We have tried, rather, to point out the implications of two contrasting points of view concerning intelligence. We have seen that the concept of intelligence as a faculty or entity, an innate endowment varying in amount and quality, susceptible of measurement once and for all, carries with it certain social implications. We have seen, also, that a functional theory of intelligence as a quality of behavior which results from the circumstances under which we act, precludes measurement of innate capacity. What is measured is rather the result of experience as displayed in the way a person interacts with situations at a given time. This theory would anticipate just such results as are found by the Iowa and other studies which suggest the great variability of the I.Q. These findings do not stand alone, however, in revealing its variability. Wherever human beings are treated with respect for their capacities, wherever initiative, originality, responsibility and creative expression are encouraged we find the release and enormous growth of powers of every kind.

The difference between these two outlooks is the difference between a static, custom-ridden, authoritarian world and a creative, liberating, democratic world. We can discover the true meaning of a concept only as we see the difference it makes in actual social relations and activities. Our wishing for a certain concept to be true does not make it true. But it is important that we see the difference it makes whether it is true or false. Whether the functional theory of intelligence is true or false it is exceedingly important that inquiry be thorough. Profound issues are at stake. There is no object so important for man to understand as himself and his powers and limitations. Whatever they may be, this knowledge is his greatest source of freedom. Only upon this knowledge can he build a world worthy of himself.

THE INTELLIGENCE OF NEGRO CHILDREN

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A large amount of research has been carried on by psychologists, aimed at the problem of determining the mental ability of the several groups of diverse racial and national origin which are found in American schools. It is of especial importance, in these days when much is being made in many quarters of the "doctrine of the inequality of races," that teachers in American schools have a clear understanding of the findings of psychologists at this point, and a basis for interpreting these findings.[1]

In view of the fact that by far the largest amount of experimental work and discussion on the topic of race differences in intelligence has been concerned with Negro children, the present discussion will be centered about the problem: "What is the comparative mental ability of white and Negro children in the United States?"[2]

STUDIES OF NEGRO INTELLIGENCE

A large number of studies involving the administration of mental tests to Negro children have been made since the development of the mental test technique. For purposes of evaluating the mental ability of Negro children these studies can be cast into two categories: (1) the *inter-race* approach, in which groups of whites and Negroes are compared directly on the basis of their performance on given tests, and (2) the *intra-race* approach in which sub-groups within a group of Negro subjects are compared.

THE INTER-RACE APPROACH

The inter-race approach is simple in its methodology. Typically the procedure is as follows: Two groups of subjects, one composed of whites and the other of Negroes, are selected; usually some attempt is made to equate the two groups, i.e. the subjects may be within the same age or grade range, or residents of the same locality; a standardized intelligence test is now administered to the two groups and the obtained scores are treated statistically and interpreted.

The findings of the studies which utilize this method are sufficiently consistent to permit the following generalizations:

1. *When groups of Negroes and whites are selected from the same locality and from within comparable age and grade ranges, the Negro group makes a lower average test score than the white group with which it is compared.*[3] The degree of difference appears to depend in large measure upon the geographic location of the groups compared; greatest disparity is found where the difference between the educational facilities available to the two groups is

[1]For an excellent extended treatment of this topic *cf.* Otto Klineberg, *Race Differences.* New York: Harper, 1935.

[2]As used in this discussion the terms "intelligence" and "mental ability" refer to inherent ability; the terms "test intelligence" and "psychometric intelligence" refer to intelligence ratings based on psychological tests.

[3]There are exceptions to this generalization. The average score of the Negro group equals or exceeds that of the white group in at least two published studies, one of which was conducted in Los Angeles and the other in New York.

greatest. In certain southern localities a difference of as much as 30 points in the average I.Q. has been reported; while, on the other hand, tests given to elementary school children in Washington, D. C., reveal a difference between white and Negro children of only 5 points in average I.Q.

2. *Although there is a difference in average scores, there is a considerable degree of overlapping, i.e. a number of cases in the Negro group exceed the mean (or median) score of the white group.* Again, the degree of overlapping appears to be a function of the relative status of the two groups. The range of overlapping in reported studies is from 4 per cent to 50 per cent. Typically, the degree of overlapping approximates 25 per cent.

3. *Individual differences persist within the two groups; differences within the groups are greater than differences between the groups.* A composite of all the studies concerned with Negro-white comparisons reveals that the lower and upper I.Q. limits are approximately the same for white and Negro children, i.e. some Negro children are as dull as the dullest white children, and some Negro children are as bright as the brightest white children.[4]

4. *Negro groups which had the benefit of a fairly adequate environment may score higher than comparable groups which have experienced an inadequate environment.* This fact was first noticed when the intelligence test scores (Army Alpha) of recruits in the American army during the First World War were analyzed. It was found that the median scores of Negro recruits of certain northern states, *viz.*, Ohio, Pennsylvania, New York, Illinois, exceeded those of the *white* recruits from the southern states of Mississippi, Kentucky, Arkansas and Georgia. Further, studies of white children in certain isolated communities in Virginia, Tennessee and Kentucky reveal that the average I.Q. of these children ranges far below that of Negro children in more favorable environments.

Difficulties Inherent in the Inter-Race Approach. In psychometric intelligence, whites are superior to Negroes, urban children are superior to rural children, the children of native whites are superior to those of foreign born whites, individuals of high socio-economic status are superior to those of the lower socio-economic levels. In all of these group comparisons there inheres a common difficulty, namely: What factors other than native ability influence test performance, and to what extent are these factors operative in the groups being compared? In order adequately to evaluate the validity of group comparisons on the basis of intelligence test performance it is necessary to examine the assumptions of the intelligence test method.

The typical intelligence test consists of a series of carefully graded tasks selected from the experiences of children (or adults); it is based on the assumption that the tasks presented represent common factors in the life of every child (or adult) to be tested. The score earned by a given individual is interpreted in terms of the scores made by a large number of individuals who have taken the test previously—the "standardization group." Thus, an individual who earns a high score, in terms of the standardization group, is rated of high intelligence, and conversely, an indi-

[4]Several Negro children within the I.Q. (Stanford-Binet) range 170-200 have been identified.

vidual who earns a low score, in terms of the standardization group, is rated of low intelligence. It is obvious that such comparisons are valid *only* if the individual being rated, and the standardization group, have had an approximately equal opportunity to obtain the experiences presupposed common by the test. A basic assumption of the intelligence test technique is that when individuals have had this approximately equal opportunity, differences in performance may be attributed to heritable factors. When this condition is violated the test results are invalid.

It is precisely at this point that the difficulty of making group comparisons lies. If it can be demonstrated that the experiential background of a given group differs appreciably from that of the group upon which the test was standardized, the test results may not be used as a measure of the relative ability of the two groups. This fact, which is basic to a correct interpretation of the intelligence test performance of groups, or of individuals, is succinctly summarized by Schwesinger as follows:

> It must be understood basically that in order to answer the questions on our intelligence tests, children *must have had a normal opportunity for contact* with the sort of material taken up in the test. The American test *assumes* certain experiences as common to the average child in a normal American environment. As soon as the environment becomes abnormal, the only conclusion to be drawn is that the test is unfair; never that the child is abnormal . . .[5]

Opportunity is not afforded in this paper fully to adduce evidence that the Negro in America, *as a group*, is so atypical because of environmental limitations, as not to be *fairly* measured by existing intelligence tests.[6] As crucial as this point is to the general problem under consideration, it will be possible here only to state, without supporting evidence,[7] two generalizations concerning the socio-economic status of the Negro in the United States:

1. Typically, school facilities for Negro children are markedly inferior to those provided for white children; this inequality is especially severe in those localities which maintain separate schools for Negro children. The situation in one state is described in the official report of the State Agent for Negro Education in Mississippi for 1933-1935:

> School buildings need to be erected to displace the many little shanties and churches now being used . . .
>
> There is also dire need for school furniture and teaching materials—comfortable seating facilities, stores, blackboards, erasers, crayon, supplementary reading materials, maps, flashcards, and charts.
>
> In many of the 3,753 colored schools of the state there is not a decent specimen of any of the above mentioned items. In hundreds of rural schools there are just four blank, unpainted walls, a few old rickety benches, an old stove propped up on brickbats, and two or three boards nailed together and painted black for a blackboard. In many cases, this constitutes the sum total of the furniture and teaching equipment.[8]

[5]Gladys C. Schwesinger. *Heredity and Environment*, New York: Macmillan, 1933, pp. 282-283.

[6]Attention is called here to the fact that many Negro children have the benefit of an adequate environment. This point will be dealt with later in the discussion.

[7]For a more extended discussion *cf.* Doxey Wilkerson, *Special Problems of Negro Education*, Staff Study Number 12, Prepared for the Advisory Committee on Education, Washington; U. S. Government Printing Office. 1939; Horace M. Bond, *The Education of the Negro in the American Social Order*, New York: Prentice Hall, 1934.

[8]Cited in Doxey Wilkerson, *op. cit.* pp. 28-29.

Do children in schools such as these have a "normal opportunity for contact with the sort of material taken up in the [intelligence] test"? Obviously not. Although the situation described in the quotation above is about the worst now to be found anywhere, it typifies the educational opportunities which have been available to millions of Negro children.

2. Typically, the Negro child comes from a home which occupies a place in the lower economic levels. Characteristically, such homes do not provide the type of physical and social environment which appears to facilitate optimum mental development, nor do they provide the cultural stimulation that undoubtedly plays a part in the child's development.

No one familiar with the generally sub-average educational facilities which exist for Negro children, cognizant of the squalor and privation which characterize the lives of individuals whom our social order consigns to the lower economic levels, appreciative of the essential lack of cultural stimulation and intellectual challenge which exist for the mass of Negroes in America, can be surprised at the generally sub-average performance of Negro children on measures of intelligence.

The Intra-Race Approach

The second method of attacking the problem of the comparative mental ability of Negro children is the intra-race approach. This approach has the advantage of eliminating the troublesome variable identified with membership in different racial groups[9] and of focusing attention upon the crucial factor of variability within the Negro group.

Briefly mentioned here are: (1) studies of the influence of a changed environment upon the test performance of Negro groups; (2) studies of the influence of race-mixture; and (3) studies of gifted Negro children.

Influence of Changed Environment. There is a large body of literature which supports the conclusion that an improvement in environment effects an improvement in intelligence test performance. It may be assumed that, if the generally sub-average test performance of Negro children is due to environmental factors, then, other things being equal, an improvement in test performance should accompany an improvement in the environment. All of the evidence with which the writer is familiar supports this assumption.

Most revealing at this point are studies by Long[10] of Washington, D. C., school children and by Klineberg,[11] of New York City school children. These investigators, assuming that southern Negro school children who have migrated to northern communities have thereby improved their environment (at least in so far as schools are concerned), studied the effect of length of residence in the new environment upon intelligence test performance. A close positive relationship between test score and length of residence was found; that is, the longer the residence in the new environment, the higher the average I.Q. These studies afford direct evidence that

[9]The intra-race approach involves inter-race comparisons, of course, since the tests used are those which have been standardized upon white groups.

[10]Howard H. Long. "The Intelligence of Colored Elementary Pupils in Washington, D. C." *Journal of Negro Education*, 3:205-222, 1934.

[11]Otto Klineberg, op. cit. Ch. IX.

improvement in environment definitely improves the test performance of Negro children, even when the improvement occurs at a relatively late stage in the child's development. It should be noted that although the environment of these New York and Washington children was improved, it was by no means optimum, since typically the Negroes in these cities are found in the lower socio-economic levels and experience all the concomitant handicaps of this classification.

Other studies afford a more indirect and less conclusive measure of the influence of improved environment. Although it is not possible to make a valid comparison on the basis of the conglomerate of studies, it appears that, in general, the higher average I.Q.'s among Negro groups are found in those localities in which the Negroes participate more adequately in economic and educational opportunities.

The Influence of Race Mixture. Since, in the United States, the term Negro has been afforded a sociological rather than an anthropological connotation, there is a wide range in amount of white ancestry among American Negroes. This fact has given rise to the "mulatto hypothesis," namely, that Negroes having a large amount of white ancestry are superior in intelligence to those having a lesser amount.

A number of studies have been concerned with the testing of this hypothesis. The procedure is to classify a group of Negro subjects on the basis of certain Negroid characteristics, such as degree of pigmentation, width of nose and thickness of lips, and then to examine the relationship between these several indices and standing on intelligence tests. Due to the difficulty of determining racial composition, this procedure is not sufficiently precise to admit of conclusive generalization. The weight of experimental evidence, nevertheless, clearly indicates that psychometric intelligence is not conditioned by the relative proportions of white and Negro ancestry.[12]

Studies of Gifted Children.[13] Critics of the inter-race approach hold that the low scores usually made by Negro children may be explained by environmental factors. There are, however (and this fact is quite generally overlooked) Negro children nurtured in an environment which is equal or superior to that of the average white child. If race is not a limiting factor, such children should be distributed, on the basis of psychometric intelligence, in much the same way as are typical groups of American white children, and among them should be found a "normal" proportion of very superior cases.

Analysis of the I.Q. distributions given in the studies of Negro children not selected on the basis of intelligence, reveals that in a number of instances the proportion of Negro children of I.Q. 130 or above equals or exceeds the normal proportion of such children in typical white populations. Several studies of Negro children of superior intelligence have been reported; the most noteworthy of these investigations were conducted among Washington, D. C., and Chicago children. These studies show that superior Negro children exhibit the same characteristics

[12]For a review of this literature *cf.* Paul A. Witty, and Martin D. Jenkins, "Intra-Race Testing and Negro Intelligence." *Journal of Psychology,* 1:179-192, 1936.

[13]For a more intensive treatment of this topic *cf.* Martin D. Jenkins, "A Socio-Psychological Study of Negro Children of Superior Intelligence." *Journal of Negro Education.* 5:175-190, 1936.

that typify superior children of other racial groups: they are found, in general, in the higher socio-economic levels; they are spread rather evenly throughout the several age and grade levels of the elementary school; they manifest superiority in subject-matter achievement and in school progress. It is of further significance that these children constitute a typical cross-section, in racial composition, of the American Negro population.

Little published material relative to Negro children in the very highest ranges of psychometric intelligence is available. The writer has identified a Negro child of Stanford-Binet I.Q. 200 and knows of perhaps a dozen others who have tested above Stanford-Binet I.Q. 160. These extreme deviates are of the greatest significance since they indicate that Negro children are as variable as other racial groups, and that Negro ancestry is not a *limiting* factor in psychometric intelligence.

Authoritative Interpretation of the Studies

Taken altogether what light do the studies of the intelligence of Negro children shed on the question of the comparative mental abilities of white and Negro children? In view of the fact that the studies afford no clear-cut answer to this question, it would appear that the *interpretations* of representative authorities would be helpful—although admittedly inconclusive—in arriving at a tentative conclusion.

The Conclusion of Scientists Relative to Racial Differences in Mental Ability. Thompson secured, by means of a questionnaire, the interpretations of 129 scholars in the field of racial differences.[14] His respondents included 77 psychologists, 22 educationists, and 30 sociologists and anthropologists, a list which "undoubtedly includes a very large majority and a representative number of the competent scholars in the field of racial differences."[15] Ninety-six per cent of the scholars indicated that scientific investigation has not disclosed racial differences in mental ability, and only four per cent indicated unequivocally that experimentation to date reveals any inherent mental differences. Forty-six per cent of the group believed that differences may exist even though not demonstrated, 30 per cent of the group insisted upon the hypothesis of racial equality, and 20 per cent of the group were non-committal at this point.[16] On the basis of these findings, Thompson concludes:

> . . . The data reveal unmistakably that it is the general conclusion of scholars engaged in the field of racial differences and closely allied fields that experimentation to date has neither demonstrated that there are any *inherent* mental differences between American Negroes and American whites, nor corroborates the "mulatto hypothesis"—that Negroes with more white blood are inherently mentally different from Negroes with less white blood—which is a fundamental corollary of the racial-difference thesis.[17]

The Conclusions of Reviewers Relative to Racial Differences in Mental Ability. Twelve reviews of the literature of racial comparisons (Negro-white), aside from the material which appears in textbooks

[14] Charles H. Thompson. "The Conclusions of Scientists Relative to Racial Differences," *Journal of Negro Education*, 3:494-512, Jl. 1934.

[15] Ibid. p. 497.

[16] *Ibid.*

[17] *Ibid.*

in education, psychology, etc., have appeared in the literature since 1914. Prior to 1925 reviewers consistently interpreted the differences found between whites and Negroes in psychometric intelligence to mean real differences in mental ability. It is significant that, since 1925, none of the psychologists who have critically reviewed the literature has been willing, on the basis of his review, to support the hypothesis of racial differences. Typical of this trend[18] are the conclusions of Klineberg and of Garth:

> Klineberg: The general conclusion of this book is that there is no scientific proof of racial differences in mentality. This does not necessarily mean that there are no such differences. . . . In the present state of our knowledge, however, we have no right to assume that they exist.[19]
>
> Garth: . . . any differences so far found in these traits (mental abilities) must of necessity be laid at the door of differences in experience and the environmental factors, in racial ideals, and in social status. In fact, any differences so far found may be said to be due to one of the two factors, the factor of selection or the factor of nurture.[20]

Summary

The present discussion has been centered about the problem, "What is the comparative mental ability of white and Negro children in the United States?" The findings of those studies which attempt to compare the relative intelligence of whites and Negroes on the basis of test performance, if taken at their face value, appear to support the hypothesis that Negro children are inferior to white children in intelligence, since white groups are almost invariably superior to the Negro groups with which they are compared. Analysis of the method, however, reveals that these findings may not be taken at their face value, since typically the groups compared differ in experiential background, thus invalidating the tests as a measure of the intelligence of the disadvantaged group.

The findings of those studies which utilize the intra-race approach, i.e. in which sub-groups within a group of Negro subjects are compared, constitute evidence against the hypothesis of race differences in intelligence. Of especial significance in this area is the identification of Negro children who test in the very highest ranges of psychometric intelligence.

[18]For a summary of the conclusions *cf.* Martin D. Jenkins, "The Mental Ability of the American Negro," *Journal of Negro Education*, 8:511-520, 1939.

[19]Otto Klineberg. *Race Differences*, New York: Harper, 1935, p. 342.

[20]Thomas R. Garth. "The Hypothesis of Racial Difference." *Journal of Social Philosophy*, 2:231. 1937.

SOME EDUCATIONAL IMPLICATIONS OF THE "CHANGING I. Q."

MILTON J. COHLER

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Six years after he had invented his measuring device for intelligence Alfred Binet expressed doubt that his tests measured "natural intelligence" separated from "instruction." In his first published account of the Binet-Simon Tests he stated: "It is understood that we here separate natural intelligence and instruction. . . . We believe that we have succeeded in completely disregarding the acquired information of the subject . . . "[1]

Writing for the same journal six years later, Binet seemed to be disturbed that Decroly, working in Brussels, found that her subjects ranked higher in mental age[2] than the pupils used by Binet in determining mental age levels.[3] Binet suggested that social conditions in the tenth arrondissement in Paris were different from those obtaining among pupils in a select private school in Brussels. "How does it happen," says Binet,

> "that the social condition, which *exercises* (Italics the writer's) such an influence over the pupils of Mlle. Degand, is not of the least importance in a primary class here in Paris? Perhaps it is because the social differences among children of our primary school are not distinct enough to produce a difference of intellectual development; for even when the children come of parents in easy circumstances, they do not see their parents as often as do the children of the rich; they are left more to themselves; the parents make a good living, but they live away from home, enter late at night, and do not bother much with their children. . . . And it must be added that what equalizes the children of different social conditions in the primary school is that they all receive the same kind of instruction in class."

In the foregoing quotation, one finds support for the environmentalists' point of view concerning intelligence. There is nothing strange or distinctly new in the present emphasis. Binet's view was clearly altered during his experimentation. By 1911, he had accumulated sufficient data by his newly made instrument to serve as a basis for a *critical* review and broader interpretation of intelligence.

Like Binet, American psychologists have gone through the same stages; first, of certainty that the aggregate of tests in an intelligence scale measures traits with which the subject was born and which he will carry unaltered to his grave; and, next, the suspicion that the impact of environmental opportunities on a person influences his performance on a series of tests measuring acquisitions of knowledge, reasoning, and judgment. Contemporary psychologists are now in the stage of studying the effects of environment on the elusive congeries of traits of human personality which have so far eluded definition, and which are commonly called intelligence.

[1]Binet, A., and Simon, T. "The development of intelligence in children." Translated from *L'Annee Psych.*, by Kite, E. Baltimore, Md.: Williams and Wilkins Co., 1916.

[2]Wilhelm Stern had not yet devised the I.Q.

[3]Idem.

Let us observe that few if any students of this problem claim that intelligence tests measure intelligence directly. The hereditarians claim to measure acquisitions which are the rather certain outcome of the general social milieu for individuals having a specific biologic heredity. The environmentalists insist that sharp disparities and variations in opportunity within the general social milieu bring about *large* variations in performance which reflect the interaction of environment and heredity.

The hereditarians point to evidence disclosing the fact that individuals and groups do not vary greatly in intelligence ratios from childhood to adulthood, and they show that children are similar in this respect to their parents. Gifted children, too, were found by Hollingworth[4] to remain in the top centile, or close to it, at maturity. Hollingworth fails to mention the fact, however, that a drop from the top to the ninety-eighth centile may mean an alteration of twenty points or more in I.Q. Furthermore she introduces no evidence that any of her subjects had undergone any marked change in environment.

Thus, say the environmentalists, she has missed the crucial issue. We know from Hildreth's study that the chances are about one in twenty-one that a pupil will change fourteen points or more in I.Q., even when he belongs to a group in which no systematic attempt is made to alter the environment markedly.[5] We can demonstrate further that certain groups of people would have had different intelligence levels if environmental conditions had been different; finally, it is abundantly clear that certain individuals and groups *have* been changed by marked changes in environmental opportunities.

From these considerations, two questions are raised:

1. Is the intelligence level of an individual or group capable of significant change through control or alteration of environmental opportunities?

2. If the answer is in the affirmative, what is the basis of that control?

Bagley answered "Yes" to the first question a number of years ago; he declared that the school is effective as an instrument for the improvement of intelligence.[6] In a statistical analysis of one of the most extensive testing projects ever undertaken (The U. S. army testing during the World War) he found a striking relationship between Army Alpha Test median scores in 1918 and 1900 Ayres rating of school efficiency in the respective states ($r = +.72$). He concluded, therefore, that groups may gain in intelligence ratings when educational opportunities are improved; e.g., had the people coming from the less fortunate states educationally enjoyed better opportunities their average intelligence level would have been higher.

One investigator studied changes in intelligence levels among canal boat children who attend school about five per cent of the normal amount for urban children. If school affects intelligence levels, one would expect that canal boat children who are old enough to have attended school for a few years would be lower in intelligence than chil-

[4]Hollingsworth, L. "The Centile Status of Gifted Children at Maturity," *J. of Genet. Psych.*, 45 (1934), 106-120.

[5]Hildreth, G. "Stanford-Binet Retests of 441 School Children," *J. of Genet. Psych.*, 33 (1926), 365-386.

[6]Bagley, W. C. Determinism in Education. Baltimore, Md., Warwick and York, 1928.

dren younger than school age. This is exactly what was found. Asher obtained similar results with isolated Kentucky mountain children.[7]

Wellman found changes in I.Q. in a genetic study of individual children who attended a superior type of school. Growth in I.Q. was rather general, with one 55-point increase being recorded; and gains of twenty points were rather common.[8] Furthermore, groups of pupils in three different schools showed different patterns of mental growth. Hence Wellman speaks of the "mental stimulation value" of a given school.[9] Klineberg studied 3000 Negro children who had migrated to New York City from the South, and found that they earned higher I.Q.'s than Negro children in the communities from which the migrants came.[10] An analysis of the data from the ten and twelve year old children in this group reveals a small consistent gain in intelligence with an increase in length of residence in New York.

Although the New York schools are much superior to those available to Negro children in the South, this gain in I.Q. cannot be attributed to the school alone. Economic and other cultural opportunities undoubtedly play a part. Even such an apparently minor influence as an improvement in housing conditions appears to exercise a beneficial effect on the I.Q. Dawson gave Stanford-Binet tests to a group of children four to ten years of age who lived in the slums of London.[11] Part of this group then moved to a new government housing project, and twelve to eighteen months after moving the entire group was re-tested. The group which stayed in the slums showed the same number of increases in I.Q. as decreases, while the group that moved all increased, though slightly.

Dawson's study dealt with a slight change in environment over a short period of time; consequently, only small changes in I.Q. could be expected. When great changes in environment take place, involving an entirely different pattern of guardianship, as well as improved economic conditions, much larger changes are recorded. Skeels reports on 73 children placed in foster homes before they were six months of age.[12] The children's true parents belonged to the lower social, economic, and educational levels; but a few years after adoption the average I.Q. of the children was 116.5, about the same average as found in exclusive private schools. The children whose true mothers had I.Q.'s of less than 80 earned an average I.Q. of 115.5. The correlation between I.Q. of true parents for whom intelligence measures were available and I.Q. of children was zero. Skodak studied a similar group of 154 children and reported similar results.[13]

Summing up this brief resume of a few of the more important studies concerned with the influence of environment on intelligence test performance, it appears likely that control of the environment

[7]Asher, E. J. "The Inadequacy of Current Intelligence Tests for Testing Kentucky Children," *J. of Genet. Psych.*, 46 (1935), 480-486.

[8]Wellman, B. L. "Mental Growth from Pre-school to College," *J. of Exper. Ed.*, 6 (1937), No. 2.

[9]Wellman, B. L. "Guiding Mental Development," *Childhood Ed.*, 15 (1938), 108-112.

[10]Klineberg, O. *Race Differences*, New York, N. Y., Harper, 1935.

[11]Dawson, S. "Environmental Influence on Mentality," *Brit. J. of Psych.*, (1936), 129-134.

[12]Skeels, H. M. "Mental Development of Children in Foster Homes," *J. of Genet. Psych.*, 49 (1936), 91-106.

[13]Skodak, M. "Children in Foster Homes," Studies in Child Welfare, Vol. 16, No. 1, Jan. 1, 1939, University of Iowa Studies, Iowa City, Iowa.

can exercise a significant influence on intelligence. How great is this influence expressed in mathematical terms? Thus far the data are not available to provide an answer, although several students of the problem have ventured estimates based on their studies.[14] The writer is inclined to believe that the relative influence of each factor can not be assigned a mathematical value. Human personality is the resultant of the influence of environment on a biologic mechanism born with the capacity for reactivity to environmental stimuli. This organism is changed by reaction to the stimuli, and the new organism thus created is not only further changed by new stimuli, but reacts in dynamic relation to new *gestalten* which constitute the stimulus.[15]

Heredity thus fixes limits through which environment can be effective, and recent studies in the field of intelligence suggest that those limits are broad. These studies suggest that when we have ascertained the intelligence level of an individual, we know only what is the present state of a large aspect of his personality. The intelligence test does not tell us what this individual's I.Q. would have been, given another type of environment. Perhaps he has achieved his maximum potentialities, perhaps his minimum, more likely somewhere in between the two extremes. If development of intelligence is left to chance, the probability is about zero that the maximum potentialities provided by heredity have been realized. Let me digress to add that chance is a term in the mathematics of probability which designates the area of our ignorance about causal relationship.

Concerning the effects of two factors on intelligence, we have some bits of knowledge — education and educational concomitants of socio-economic status. There is usually little that the school administrator can do to alter socio-economic level; but education itself can be controlled considerably, and can compensate for some of the deficiencies which are related to poor socio-economic level.

The idea that there is a dynamic variability in intelligence for a given person implies a modified concept of the I.Q. The I.Q. then ceases to be a determiner of the potentialities of the individual; it becomes just another useful *datum* about him. It tells us roughly the child's present state in this respect, and with other available information it may suggest kinds of experience which it is desirable to give a child to remedy deficiencies or stimulate growth. Other data, such as socio-economic level, assist in giving significance to one's interpretation of the I.Q. It is customary to think of brightness or dullness only in terms of deviation of the I.Q. from the average for a given population—purely a statistical comparison. One cardinal principle in the philosophy of statistics demands that we attempt to approximate in all statistical aggregates the greatest obtainable degree of homogeneity for all variables other than the experimental variable.[16] Thus, the causal relationship

[14]Binet, A., and Simon T. "The Development of Intelligence in Children," Translated from *L'Annee Psych.*, by Kite, E., Baltimore, Md., Williams and Wilkins Co., 1916.

[15]Dewey, J. "The Reflex Arc Concept in Psychology," *Psych. Rev.*, 3 (1896), 357-370.

[16]Venn, J. The Logic of Chance. An essay on the foundations and province of the theory of probability, with especial reference to its application to moral and social science. London and Cambridge, Macmillan and Co., 1866.

between socio-economic level and I.Q. would require that we separate people into socio-economic groups in using the I.Q. to judge brightness. A child with an I.Q. of 100 who comes from a socio-economic group whose average I.Q. is 85 might well be thought of as a bright child. The kind of education that would tend to fill in large experimental gaps is obviously the experience type—certainly not drill in "subjects." Children who are deficient in drill subjects may be lacking in sufficient direct experience to provide multiple conditioning; but it is inconceivable that deficiencies in experiential background could be compensated for by mere repetition of an act which has been previously unsuccessful. Not only the child who comes from a poor socio-economic background, but any child who, for any reason, has not enjoyed a richness and breadth of experience conducive to maximum development could probably raise his I.Q. if he were given rich and appropriate experiential opportunities. Even the child who has achieved a maximum I.Q. must continue to enjoy maximum opportunities in order to maintain his high status. Thus, education for improved intelligence would appear to demand an experience curriculum for everybody, entirely apart from whatever value it may have for the mastery of certain subject matter upon which schools place great stress.

An experience curriculum makes unnecessary the segregation of children according to their "intelligence." The stated purpose of grouping children according to I.Q. or mental age is to enable instruction to conform to the intelligence level of the class; children are given opportunities for learning according to ability to learn as indicated by performance on intelligence tests. Children of average intelligence are given the "standard" curriculum; those high in intelligence are given enrichment; those lower in intelligence are given just "minimum essentials" — drill on simple facts that they have difficulty in mastering because of low intelligence. When one considers, however, that low intelligence is in many instances attributable to a poverty of experience, it appears that repetitious drill on "minimum essentials" is merely an attack on symptoms of a situation which should be studied and improved. It is clear that growth in intelligence results from rich experiences and extremely varied stimulations. "Homogeneous grouping" precludes the latter and tends to minimize the former. Since children of high and average intelligence need experience to improve or maintain their level of intelligence, it appears that one must provide enriched experiences for all, and discover what are "minimum essentials" by finding out what processes and facts are employed to bring about reorganization of experiences which, for a particular child, promote growth and improve intelligence. The "minimum essentials" thus become as individual as enrichment itself, and education aims to enrich intelligence and foster its improvement in *all* children.

EDITORIAL COMMENT

There is at present no more important topic than the one to which this issue of *Educational Method* is devoted. Recent investigations at the University of Iowa have been widely publicized, and are at present the basis for widespread controversies and, it seems, for increasing argument or invective. The reader is referred to articles on the wandering I. Q. by Benjamin Simpson and Beth Wellman in the *Journal of Psychology* for April and July, 1939.

Thus the Iowa conclusions are being examined with extreme and meticulous care and the basic data, statistical procedures, and interpretations are being seriously questioned. Regardless of the ultimate decision in reference to the exact accuracy of these studies, it is certain that they have already had a rather wholesome influence: they are leading thoughtful students to re-examine certain bizarre or unverified claims growing out of a deterministic thought concerning intelligence testing.

These studies and others of the past decade have led many to believe there is one inescapable conclusion: If heredity sets limits for mental development, these limits are broad indeed. This conclusion does not depend solely upon the data of the Iowa investigations; it is supported by the work of Mandel Sherman, Harold Jones, Kurt Lewin, and Nancy Bayley. The reader of this issue should consult the evidence presented by Bayley in her recent chapter in *Mental Hygiene in Modern Education* (Farrar, 1939).

Many thoughtful scholars, after weighing all the evidence, have concluded that what we know of our world of change demands a different concept of intelligence from that which was held in high favor among American psychologists. This issue presents, it seems, documentary evidence of this need as various authors disclose the social and educational waste or havoc that are associated with the acceptance of a highly deterministic view of intelligence.

At any rate, the careful student will now be reluctant to accept as final statements such as the following:[1]

"From data so far collected, we can only say that the I. Q. is certainly constant with narrow margins."

"Psychologists no longer doubt that it is now possible to predict when a child is six years old, what his relative position will be in the total range of intellects when he is sixteen."

"Individuals of surpassing intelligence create national wealth, determine the state of industry, advance science, and make general culture possible." Hollingsworth's views are apparently in harmony with those of L. M. Terman, who stated that from the ranks of gifted children "and from nowhere else our geniuses in every line are recruited."

The editors invite the readers of this journal to weigh the evidence presented in this issue and consider whether there is a sound basis for such attitudes. For it is abundantly clear that such views as those just quoted are still potent in determining or shaping educational practices.

At the present time, a number of psychologists and educators are preparing

[1]Hollingsworth, L. S. *Gifted Children: Their Nature and Nurture*, New York, The Macmillan Co., 1926. Pp. 156, 158, 297.

another Yearbook for the N. S. S. E.; this volume will present new evidence in the nature-nurture controversy. It is to be hoped that this group will avoid the pitfalls of the *Twenty-Seventh Yearbook*[2] which, despite obvious weaknesses, has had profound and continuous influence upon education in America. Not only did the editors of this volume include data from the Jukes-Kallikaks-Edwards studies as *evidence* in the nature-nurture controversy; but they also summarized some investigations of the relationships between the occupational status of parents and children's test-intelligence. Terman's conclusions were quoted with apparent approval:

"Our data show that individuals of the various social classes present differences in early childhood—a fact which strongly suggests that the causal factor lies in original endowment rather than in environmental influences."[3]

The studies mentioned above reveal clearly the character of the investigations selected for inclusion in the *Twenty-Seventh Yearbook*. The following is illustrative of the conclusions drawn by the editors:

". . . . heredity is a force in the determination of mental ability by the side of which all other forces are 'dwarfed in comparison.' "[4]

The statistical pitfalls were numerous; the hazards of this approach were recognized but not avoided by some writers for this volume. For example, one writer found the coefficients of correlation between the intelligence test scores of many siblings to be about + .60. "Comparing this value with the average sibling correlation, + .52, found by Pearson for physical traits, which are free from ordinary environmental influence, the inference is drawn that home environment acts so as to raise the correlation between siblings from + .52 to + .60."[5] Such a conclusion depends in part upon the validity of several hypotheses such as the assumption that the intelligence tests measure intelligence *very precisely* (a clearly questionable hypothesis), and another doubtful assumption, that mental abilities (measured by tests) are transmitted in the same way as are physical traits. This second hypothesis is also undemonstrated. Moreover, it might be interesting for the sake of communication to have a definition of "ordinary environmental influence" with data in support of the allegation.

It is to be hoped that the new *Yearbook* will be conceived with greater scientific objectivity and carried forward with clarity, accuracy and acumen. It cannot, of course, do more than summarize selected findings to date, in a field where only a beginning has been made. In the meantime the reader is asked to consider the various approaches presented in this issue, and to help thus in development of a more valid approach in dealing with intelligence as it relates to living and growing in a democracy.

P. W.
L. L.

[2] *The Twenty-Seventh Yearbook of the National Society for the Study of Education. Part I. Nature and Nurture: Their Influence upon Intelligence. Part II. Their Influence upon Achievement.* Bloomington, Illinois, Public School Pub. Co., 1928. Pp. IX, 465; XVI, 397.

[3] Op. cit. Part II, p. 272.

[4] Op. cit. Part I, p. 309.

[5] Op. cit. Prefatory note to Chapter III, by E. L. Thorndike, p. 40.

To the Members

Now that summer vacations and summer schools are fading into the background of our consciousness and school problems are challenging our best efforts, we may well ask ourselves these questions: Have I put my knowledge and enthusiasm to work effectively this fall? Am I really a better teacher, or supervisor, or administrator because of my summer experiences?

Educational Method

We hope that the October issue of the journal has helped many of us not only to think more clearly but to act more wisely in the light of our convictions. Have you used the October issue as a basis of discussion at one of your meetings? Did you find something particularly helpful in it? How do you like the November issue? Write and tell us your reactions to the issues. We want to keep the journal close to the needs of schools everywhere.

Fall Meeting of the Executive Committee

The Executive Committee met at the Hotel Stevens in Chicago on October 21 and 22, to make final plans for the February meetings of the Department in St. Louis and to attend to other matters of importance.

We shall need your help to make the St. Louis sessions successful. Further details will reach you soon.

The Twelfth Yearbook (1939)

Newer Instructional Practices of Promise, the Twelfth Yearbook of the Department, has gone to press. Its practicability will appeal to you and its new features will surprise you.

The 1940 Yearbook

Dr. Charles Knudsen and his committee have recently sent you a written request for help on the Thirteenth Yearbook, *Implications for Classroom Practice of the Report: The Purposes of Education in American Democracy.* They have asked you to do two things:

1. Rank the objectives according to the degree to which they are now being achieved.

2. Write a one-page description of something that is being done in your school system to achieve these objectives.

Your willingness to contribute to the Yearbook in these ways will help determine its helpfulness. If you have not yet answered their appeal, please do so at once. The Yearbook Committee would also welcome pictures of actual classroom situations.

Julia L. Hahn

NEWS FROM THE FIELD

Our membership and subscription files continue to expand. We are especially glad to have so many state supervisors and state directors of instruction join the Department.

Miss Cecilia Unzicker Stuart, Chief, Early Elementary Childhood and Elementary Education for the State of Pennsylvania, sent us an excellent report of the program of supervision as carried out in that State. An excerpt from her report may be of interest to you. It follows:

> "A number of classroom situations were studied in each of approximately fifty school districts. Almost all of these were in answer to calls for specific help. Activities engaged in were: surveying situations to help locate most urgent needs and problems, helping work out solutions to problems, and helping in the development of a philosophy of education to guide action. Group or individual conferences and sometimes both were held with teachers and with supervisory and administrative officers. A report of practically every visitation was written and almost always a summary of tentative conclusions and recommendations sent to the superintendent."

Miss Stuart continued in her report to discuss work with teachers colleges, with parent groups, institutes, conventions, etc.

The National Office has received fine reports from the state departments in many states. If the interest in such were great enough these reports could be put into one or two page reports and sent to our members. If you are interested in this, why not let us hear from you?

A splendid report comes from Mr. W. W. McCune, Assistant Superintendent of Savannah, Georgia, Public Schools. For some years Georgia has been working on a curriculum revision program. Thousands of teachers have actively participated in the program. Savannah's contribution is a record in the form of a bulletin of how the elementary school curriculum of Waters Avenue School has grown out of the life of the community. The bulletin is available to anyone for the price of sixty cents and is well worth examining.

A mimeographed bulletin from the State Board of Education, Richmond, Virginia, has reached our office. A committee, composed of Miss Ruth Henderson, Fred M. Alexander, George J. Oliver, Thomas D. Eason and C. W. Dickinson, has prepared a cumulative list of titles of books for use in professional libraries. Virginia allows a small amount of state aid for the purchase of professional books. We are glad to find the Yearbooks of the Department on the list. You may be able to secure a copy of this list from C. W. Dickinson, Director, Division of School Libraries and Textbooks.

Every member of our Department should be familiar with the radio programs sponsored by the National Education Association. THE AMERICAN SCHOOL OF THE AIR begins its ninth year on the radio in aid to teachers and schools. From October, 1939, through April, 1940, the Association, in cooperation with the Columbia Broadcasting System, presents:

Every Tuesday — FOLK MUSIC OF AMERICA. For upper elementary grades, junior and senior high schools. Includes folk literature.

Every Wednesday — NEW HORIZONS. For elementary grades and junior high schools. A program of geography and science directed by the famous scientist-explorer, Roy Chapman Andrews.

Every Thursday — TALES FROM FAR AND NEAR. For the elementary grades, junior and senior high schools. A social science program describing and interpreting current affairs.

A free copy of the teacher's manual suggesting effective ways to use the broadcasts, may be secured by writing The National Education Association, Washington, D. C.

The writer has just given the manuscript of the Twelfth Yearbook of the Department of Supervisors and Directors of Instruction to the printer. It will come from the press about December 1. The Chairman of the Yearbook Committee, Miss Helen Heffernan, Chief, Division of Elementary Education, California State Department of Education, has studied education in California for the past fourteen years from her present position. Under her direction an extensive program of publications in the field of elementary education has gone forward in that State. These publications are widely used throughout the country. Miss Heffernan's major interests are curriculum development, rural schools, reading and literature, and science in the elementary school program. She has worked in close contact with teachers and classroom problems. She has taught during the summers at the University of California, Stanford University, Chico State College, San Francisco State College and Utah Agricultural College. She has appeared at professional meetings in Michigan, Kansas, Idaho, Utah, Nevada and Oregon.

In September, Miss Fannie J. Ragland, Director of Upper Elementary Grades, Cincinnati Public Schools, and State Promotion Chairman for the Department in Ohio, sent out a questionnaire to supervisors of the State inviting suggestions for consideration by the group in the meeting to be held in Columbus, October 14. Members of this Department may be interested in the comments received. They were:

1. Wider acceptance of the major purposes of supervision by school workers (supervisors, supervised, and administrators) and the public.
2. Such modifications of conditions as are needed to make it possible for supervisors and supervised to engage in activities consistent with major purposes.
3. Improvement of human relationships.
4. Stimulation and guidance of professional growth.
5. Providing assistance and encouragement for the new teacher.
6. Improvement of the situation in which the elementary teacher works —curriculum materials of instruction, equipment, organization of elementary school, teacher load, public attitude toward desirable changes, etc.
7. Better understanding and cooperation between home and the school.

The Ohio supervisors have developed a plan for the year that will give them opportunity to think through some of these problems together.

Do not fail to attend the REGIONAL CONFERENCE of the Department of Supervisors and Directors of Instruction in Chicago, November 16-18, if you are near enough to that city. This is a

Study Conference on Supervision and Leadership. We urge your participation.

Personal Notes

William H. Burton, former president and member of the executive department of the Department of Supervisors and Directors of Instruction, has entered upon his new duties as Director of Apprenticeship in the Graduate School of Education, Harvard University. He has been assigned the task of organizing a system of interneships for practice teachers. The general program of teacher training at Harvard will also come in for analysis and reorganization. Professor Burton was for the last seven years at the University of Southern California, and prior to that at the University of Chicago.

Dr. W. H. Kilpatrick has assumed the editorship of *Frontiers of Democracy*, the publication formerly known as *The Social Frontier*, which is to be published under the sponsorship of the Progressive Education Association.

Dr. W. C. Bagley has become editor of *School and Society*, now to be published under the direction of the Society for the Advance of Education.

Edna Simmons,
Executive Secretary.

THE READER'S GUIDE

Editor, Lois Coffey Mossman

REORGANIZING SECONDARY EDUCATION. Commission on Secondary School Curriculum of the Progressive Education Association, by V. T. Thayer, Caroline Zachry, and Ruth Kotinsky. D. Appleton-Century, New York, 1939. 483p. $3.00.

This book is the second major publication of the Commission on the Secondary School Curriculum of the Progressive Education Association and its committees, the first being *Science in General Education.* The character of these two books leads one to await with anticipation the other publications written by its committees which are yet to follow. This Commission's work is generally recognized as being basically important to the whole program of activities in the area of secondary education launched some years ago by the Progressive Education Association.

As explained in the Preface the Commission has created several committees to carry on various phases of its work. Notable among these in relation to this volume is Dr. Zachry's committee on the Study of Adolescents. The nature of the report of this committee determines that the Commission build the proposals for reorganization of secondary education contained in this book upon the proposition that secondary education should be based upon the needs of adolescents. Through case study techniques used by Dr. Zachry's committee, four large areas of need were identified: "immediate social relationships, wider social relationships, economic relationships, and—closely related to all of these—personal living." Reports of the work of this committee and deductions from it form the basis for Parts I and II of the book — the bulk of the whole volume. Part III supplies some important implications for organization and administration. Despite the emphasis upon needs of adolescents as the basis for secondary education, the book is not satisfied to leave Progressive Education at Bode's "crossroads" for although it stresses the individual "child" as the center of reference in education, it assumes without reservation that these needs are to be dealt with in ways which presume a thorough-going application of the principles of democracy to all aspects of life. The book thus provides a sound basis and excellent suggestions for educational programs in secondary schools which accept the democratically socialized, in contrast to the highly individualized accent in education. The careful case study work of the Committee on the Study of Adolescents gives us every reason to believe that the four areas of need outlined are the most basic categories yet to be set up.

Part II is devoted to proposals for meeting these needs. A strong feature of the book revealed in Part II is recognition that this task is not wholly and perhaps not primarily one belonging to the school. It is shared by all persons and every agency impinging upon the adolescent group and unless all work together to meet these needs, few major improvements may be expected. This emphasis ought to have a wholesome effect both upon those who ascribe all

youth's faults and shortcomings to the school, and upon those who hope merely by improving the school to present the world with a generation of perfect youth. With this book in hand, it is now more obvious than ever that the school is only one of many educative agencies molding youth and it is neither honest nor wise for educators to pretend otherwise. Since these proposed categories of need are so fundamental and since our current school attempts at meeting youth-needs are so largely superficial, perhaps it is inevitable that the suggestions for meeting these needs made in Part II may sound a bit remote and impractical to many typical secondary school workers. Those who may be inclined to make such criticisms of the book should recall that a research group is not under any obligation to bring in reports of research results which are easily put into practice. If as in this case, there is a wide gap between the practices which their results call for and those commonly utilized, the best the committee can do is to propose means by which the gap may eventually be eliminated. There is therefore much work to do between the place where Part II stops and actual programs called for by this approach to secondary education begin. We have in this book, however, the basis for action and some good direction pointers. The rest will have to be done in the schools and in schools of education which prepare teachers for the schools. As a result of a careful evaluation of actual experience in typical schools which earnestly seek to reorganize secondary education as here proposed we shall probably get the answer to the question of whether as much dependence can be placed upon instruction organized in and around the subject areas as these authors seem to favor. The type of "general" education program discussed in this book which washes out the lines between narrow subjects but retains those of "the subject matter areas" still has to prove its effectiveness as the best plan for meeting the needs of adolescents. It may be that still wider departures from the conventional curricular pattern will be required.

Part III, "Organization and Administration" promises more in this title than can be delivered in two chapters; one on Guidance and one on Staff Relationship, Curriculum Building, and Evaluation. These chapters deal with important elements in the situation, but if secondary schools are to be so organized and administered that they are effective instruments for meeting these fundamental needs for all youth, those who are to be responsible will require not only more specific help than is offered here but also help on problems not even mentioned here. It may be these authors' idea that their approach to secondary education minimizes the part of the administrator—and doubtless it would basically reorganize the process —but such basic reorganization of secondary education as is proposed here will create more problems of organization and administration than it will eliminate. Though the administrative function may not be discharged as autocratically as some allege if secondary education should be reorganized as suggested by these authors; though it may become a shared function participated in more fully by the faculty, those who will be responsible — as someone must be — will be faced with problems quite

beyond the range of those included in Part III. If the area of organization and administration is to be entered at all in this book, is it not important that it should be developed with the same detail as are the phases of the problem treated in Parts I and II?

This book presents us with an excellent statement of the Commission's points of view with which to start some most profitable study and discussion both among students in training and teachers in service. As this study and discussion lead to clearer social and educational concepts, better practices will evolve and thorough-going reorganization of secondary education will get another distinct impetus. For having provided us all with such a clear statement of a basically fundamental approach to this study and discussion, this Commission should be both credited and congratulated.

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LIFE: A PSYCHOLOGICAL SURVEY, by Sidney L. Pressey, J. Elliott Janney, and Raymond G. Kuhlen. Harper & Brothers, New York, 1939. xxxiii + 654p. $2.50.

The effort to render the best and most modern psychological knowledge operative in the experience of the average man has been made increasingly in recent years by a number of skilled textbook writers. None, however, have been as successful in their commendable endeavor as the authors of this unusual volume. In 600 pages they have packed the essence (or the most exciting substance) of contemporary social, educational, developmental, and "applied" psychology for the use of elementary students. If psychology—or the whole domain of collegiate facts, information, and principles—should still appear to any reader as dull, dry, and unappealing after exposure to such selected content as here organized, there is probably little hope of ever vitalizing the world of scholarship for him.

Were another Emerson to write an essay on the "Conduct of Life" in 1939 he would be compelled to consider the material and viewpoint of this book. Its controlling design is a portrayal of the life cycle in its entirety, plus suggestions derived from empirical data of the most suitable means for guiding the course of individual growth. The self-improvement note is pervasive but not insistent. Since this text is inevitably forced to interpret as well as to report the findings of many investigators, it may not be unimportant to observe that these conclusions commonly have a liberal and humanitarian flavor. Indeed, if scientists are to be wholly scientific, how could it be otherwise?

The performance, of course, falls short at several points. Its discussion of the value-experiences seems a bit thin and unsympathetic, and the treatment of the "culture" is necessarily weakened by the exclusion of significant anthropological accounts. The point of view that the culture (material as well as "invisible") in all its myriad forms is subtly educative would seem to deserve more central emphasis. Furthermore, the absence of attention to theoretical or systematic issues may be disastrous if one of the basic facts in all social adjustments is the existence of distinguishable mental frames which mould all that perception delivers to the organism.

Pedagogically, this production is what one would expect a skilled educational psychologist like Professor Pressey to guarantee. The graphs and tables are numerous and useful (perhaps just a little too many of both?) and the style simple and unobtrusive. The only error the reviewer has noticed is the wrong date given for Lindbergh's transatlantic flight on page 116. It may also be healthy to dissent a bit from some of the advice presented under the head of job strategy. A few of the recommendations for getting along with the boss appear unmanly, to say the least, and it is doubtful if such an absolutionist declaration as that a worker "should do what he is told to do" is compatible with a mature industrial democracy, even though it might be defended as "realism" of a certain kind.

But these are minor, and for all one knows, uncertain blemishes. If the reviewer had had this volume to use in the days when he taught introductory psychology he would have been spared the apologetic attitude that is inevitable whenever he encounters some of his former students who were force-fed on what false professional pride still calls "sterner stuff."

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GROWTH IN UNDERSTANDING OF GEOGRAPHIC TERMS IN GRADES IV TO VII, by T. J. Eskridge, Jr. Duke University Research Studies in Education, Number 4. Duke University Press, Durham, North Carolina, 1939. x 68p, 32 tables, 3 figures, bibliography. $1.00.

The purpose of this study is to separate verbal learning from connotational learning in the use of words and phrases in geography. Dr. Eskridge has attempted to trace the growth in the meaningful use of certain important terms employed recurrently in geography from the fourth to the seventh grades, to isolate the factors involved, and to formulate the principles of growth. He states clearly that the problem centers in the matter of "meanings"—their nature, mode of emergence, and so forth, rather than in the matter of vocabulary as previous investigators have viewed it. His task therefore becomes one of isolating some of the factors and principles which condition learning and consequently growth, in understanding of terms used in geography.

The investigator first derived a list of 135 terms on the basis of frequency of use in four geography textbook series. He then defined growth in understanding as: (a) increase in number of terms for which meanings are known, (b) increase in the number of meanings known for individual terms. And finally he constructed and administered essay and new-type tests to approximately 500 pupils.

From the data secured, he determined medians for the four grades and plotted growth curves as indicated by the multiple choice tests, by the identification tests, and by the concrete material tests. Interestingly, these growth curves as plotted from different kinds of tests, do not parallel one another, although one would assume *a priori* that they would do so. By a process of analysis, these divergences are shown to be the result of six conditioning factors: amount and kind of experience, level of subject matter attainment, ways in which meanings are verbalized, mental

age, and sex. Dr. Eskridge formulates the following principles: growth proceeds through (a) . . . an increase in the number of different kinds of meanings learned; (b) . . . the increase of general information; (c) . . . substitution of basic for proximate or associated meanings; (d) . . . the development of the comprehensiveness of meanings; (e) . . . the reduction of errors.

In general, this is a useful and suggestive study, but there are certain shortcomings embedded in it. For one thing, the investigator has needlessly clouded the issue by using the expression "geographic terms" as though it were synonymous with "terms occurring in geography textbooks." For another, he ignores the fact that pupil errors may be owing to gross ignorance on the part of the teacher, or to the presence of widespread fallacies in society, and in certain cases, to the incompetence of textbook writers. An even more serious factor is where the investigator's results are modified by his own errors. For instance, in grading a multiple choice test Dr. Eskridge selects a wrong alternative and rejects the correct one, meanwhile commenting on the fact that so many pupils have made the "wrong" selection. In this instance, had he consulted a book on meteorology, he might easily have found the distinction between *rainfall* and *precipitation*. Similarly, he also confuses *altitude* and *relief* when attempting to evaluate pupil responses. In view of the highly worth-while character of this problem and his competent handling of testing and measuring procedure, it may be regretted that the investigator himself is not a geographer or that he did not receive competent geographical supervision. It is disappointing that he does not recognize that in many instances, neither the teaching nor the selection of textbooks is such as to favor growth in geographical understanding. Even the series of geography textbooks best designed to promote growth, now on the market, was not used in the schools selected for his study. Hence we have no idea what the growth curve would look like for students using such textbooks.

Some of his results carry certain implications which he might well have recognized: for example, the apparent fact that definitions *increase* but do not *improve* from one grade to another. Another example is his conclusion that a mental age of twelve is required to learn "longitude." If this be true (and the reviewer is inclined to think that it is) then the current practice of teaching the map in third and fourth grades may be a form of educational insanity. Moreover, it may be that the curriculum of many schools is so arranged that a large part of the geography instruction is finished before the time a mental age sufficient to understand many terms now required in geography, is reached. Finally, the whole study has an important bearing upon the so-called "knowledge" objective so often set up in the teaching of the social studies.

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SPORTS FOR THE HANDICAPPED, by George T. Stafford. Prentice-Hall, Inc., New York, 1939. 302p. $2.75.

This book represents the very sincere attempt of the author to make available to other physical education workers and to physicians dealing with general physical education and "corrective" pro-

grams, the results of his valuable experience as a worker, administrator and student of physical education programs in secondary schools. Fundamentally the book attempts to prove that the types of physical deviates with whom the book is concerned, may be best served by a special physical education program of activities selected and prescribed from the general physical education games curriculum to comprise what he terms "adapted sports." The interest, sympathy, sincerity and experience of the author are obvious.

Unfortunately the book is misnamed *Sports for the Handicapped*, probably because of the flair for literature regarding work with the handicapped, which was considerably stimulated by the formation several years ago of the first complete Department of Education of the Handicapped at Teachers College, Columbia University. First, the book is misnamed because the types of true handicapped mentioned include only those known in the Teachers College classification as motor-handicapped, these being principally orthopedic cases, plus cardiacs. Secondly, the author has included many types of physical deviates who are not considered to be among the truly handicapped at all, but are usually recognized as needing either programs of comparatively simple physical therapy or corrective physical education, or as requiring, temporarily or permanently, certain limitations and adaptation of the physical education programs for normals. The author makes only adaptations since, probably wisely, he presents no new types of activities, but confines himself to selection of activities from the standard curriculum for his "forgotten young men and young women" whose previous guidance and education in elementary school, and consequent adjustment in many instances, the author fails to mention.

Much of the book, both in the first hundred pages and scattered throughout the other sections, consists of philosophies and psychologies involved in dealing with the handicapped (here the author usually seems to consider definitely the true handicapped). In the opinion of the reviewer, the author would have been better advised to state his own opinions and educational fundamentals briefly instead of the more scholarly historical and quoted or paraphrased opinions of others. Thus he would reach his main contentions and personal contribution more rapidly. This would permit him, in a book of the same size, to deal extensively with case histories and more specific situations instead of curtailed general prescriptions. He makes a mistake in introducing a medical section which does not appear to have been reviewed by someone with medical clinical experience and point of view, the result being textbookish, obviously library gleanings rather than practical clinical experience. The failure to lean upon Phelps' material on cerebral palsy is unfortunate since Phelps is the recognized authority in the field and has the exact material needed by this author.

For these faults the publisher and the advisers rather than the author are probably to blame. Medical authors, considerably guided by Fishbein, have learned to turn directly to the subject in hand, wasting as little time as possible with the amenities and quotations, and giving forth at length their real contribution, their personal experience.

There is no justification for a review of the literature in connection with corrective physical education, on which ample or more has been written. And the same applies to the material on the foundations of education. Regarding the general psychology, philosophies and methodology of physical education, the contributions of Williams, Wood and their disciples are ample, and need only be referred to—although this author has almost entirely omitted this group to whom credit for the change from the formal to the natural system of physical education is annually attributed.

The author's obvious thesis that corrective physical education (under whatever name) should be replaced as far as possible by adaptations of natural activities, has been in all minds for some years. However, the idea has not yet been found possible or practicable beyond a certain point.

This book should be titled something like *Adapted Sports for Certain Types of Physical Deviates in Secondary Schools.* The author should be allowed to expand more of his valuable personal experience and should, almost totally, confine himself to that, except where the quoting of authority justifies, in necessity, some position he takes clinically. It is my opinion that such books are better written with a medical collaborator.

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READING AND THE EDUCATIVE PROCESS, by Paul Witty and David Kopel. Ginn & Co., New York. 374p.

It is gratifying to find a book on children's reading which emphasizes the relation of the problems involved to an educational scene broader than the reading period and the classroom. The piecemeal, mass approach disguised under the assuring adjective "systematic" and characteristic of all too many reading programs has long dominated school practice, materials and literature dealing with these. The fact that many children and adults exposed to such methods know how to read but do not do so voluntarily nor with discrimination challenges thoughtful people to examine procedures that emphasize the individual's own pattern of learning as well as conditions affecting it.

A longer view of learning to read than is usually found in one book is presented here and the reader gets some notion of the relation of the elementary school's program to that of the secondary school.

The authors emphasize the necessity for constant and continuous analysis of the learner's interests and needs and the adjustment of method and material with respect to these, not only in dealing with remedial problems but for the prevention of reading difficulties at any stage in the child's development. Factors affecting success or failure in this process are clearly set forth and suggested areas for study and investigation are proposed. Extensive record forms are given in the appendix. These are specific enough for anyone inexperienced in using child study inventories and are suggestive for any who wish to make adaptations for specific cases.

The challenge presented to all who deal with children's reading to enlarge their scholarship in children's books and reading materials seems most appropriate. Excellent helps for expanding the adults' experiences with a wide

variety of books are presented. This area of a teacher's scholarship has long been sanctioned but needs much re-emphasis and encouragement.

The case studies appearing in the chapter on the clinical approach to reading difficulties are varied and are particularly valuable because they make concrete the fact that reading disability is specific and cannot be attributed to one cause or one set of factors. This is in keeping with the theme of the whole book which seems to be that all good teaching of reading is "an exploratory, experimental enterprise, associated with the production of successful experiences and wholesome satisfactions."

This reviewer confesses to some disappointment that the authors did not give more space to a consideration which they mention but do not expand. In their opening chapter they point out the relationship existing between community attitudes toward all art forms and the task of improving reading habits and tastes. This needs expansion and clarification. The general and most common attack has been made directly on the child as he reads. In this book we have our attention directed to the child as he engages not only in reading but in many other educative processes. Do we not need to be aware of and deal with still another circle of influence, those community conditions which can be modified and improved and which directly affect availability, popularity and quality of reading materials and set patterns and modes of behavior?

This book makes a real contribution to the already extensive library dealing with the field of reading. All who are concerned with children will welcome this timely emphasis designed to discourage reliance on mass procedures with their misleading generalities and to stimulate concern in a better understanding of children as they explore the possibilities of reading.

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ENRICHING THE CURRICULUM FOR THE ELEMENTARY SCHOOL CHILD. L. M. Fertsch, Chairman. National Education Association, Department of Elementary School Principals. Eighteenth Yearbook. July, 1939. Vol. XVIII, No. 6. 702p. $2.00.

This recent Yearbook of the Department of Elementary School Principals has many interesting features to make it significant. Aside from preface, President's message, and editorial comments to introduce each chapter, it has articles by fifty-six different authors. Each of these articles convinces the reader that the author is writing with sincerity and is seeking to share with others out of his own efforts to enrich the learnings of children.

A study of the editorial comments which introduce each chapter is itself illuminating by way of showing how far education has come. It would be interesting to compare these comments with the underlying points of view expressed in the early yearbooks of this organization.

The fifty-six articles included in this new yearbook likewise are convincing of the fact that in so far as elementary education is concerned the point of view is not static. Dr. Caswell's comprehensive discussion in Chapter I of the progress that has been made in the enrichment of the curriculum is reinforced by the detailed illustrations in the fifty-

five articles contained in the remaining chapters.

These illustrations are not only numerous but varied. They are grouped under six chapter headings: *Making Learning Concrete and Purposeful, Developing Appreciations and Creative Abilities, Enrichment Through School Materials and Equipment, Making Use of Community Resources, Measurement and Guidance in Relation to Curriculum Enrichment,* and *Vitalizing the Curriculum Under Various Types of School Organization.* The interpretations of educational method, means, and goals are widely varied. It is doubtful if the writers of the articles could agree on a statement of a common frame of reference for elementary education. This diversity is but internal evidence of the sincerity of the materials. The articles probably constitute a good cross-sectional memorandum of the present efforts of those throughout the country who are striving to *improve* the work of elementary schools.

In this yearbook there seems to be a rather general acceptance of the unit organization of curricular materials. Little if any data can be found in the articles which can be construed as indicating a concern in examining the bases of the unit program.

The writers in this volume who speak of *integration* use the term largely with reference to an effort to shape the school offering in the direction of more unity in organization of the school set-up or of materials. They do not follow the example of some students of the learning process who use the term only when they wish to speak of unity within the learner, integration of the self, in the continuous adjustment of personality.

The discussion of environment and its part in the curriculum seems to include observation of the environment, study of the environment, modification of environment, and service to environment—all with a more or less dissociated "take-it-or-leave-it" attitude as if it were a matter of choice as to whether the curriculum should include attention to the environment. This is not strange since curricula until recently have not considered environment. Actual examination of curricula indicates that prior to five or possibly ten years ago they seldom if ever mentioned the particular environment of the learners for whom they were written. The imperative aspect of environment in the learning process has only recently been emphasized by students of this learning process. In fact this imperative emphasis is so recently understood that we could scarcely expect to find it reflected in these descriptions of school practice.

The underlying differences in point of view that a critical student of this material might find do not, in the judgment of the reviewer, constitute an indictment of the book. The material included serves rather as a good index of what is being attempted by way of enriching the curriculum. The book further gives promise of becoming a good source of material for use by students of education.

L. C. M.